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"Around the World in Eighty Days"

By Newman Bumstead

JULES VERNE, the imaginative French novelist, sent Phileas Fogg around the world in 80 hectic days. Resolutely and tirelessly, this fictional traveler pushed onward by steamship, train, elephant back, and prairie ice sled. The year was 1872.

I too went around the world in 80 days, but, unlike Phileas Fogg, I traveled a total of only six days and spent the remaining 74 meeting the people and seeing the sights of 24 lands. The year was 1951; I went by air.

A sheaf of National Geographic Society maps, as faithful and untiring as Fogg's servant Passepartout, identified the wonders of the scene below. They helped plan before I left home and reminisce after I got back (page 713). My mission as a National Geographic cartographer was to link The Society's new 10-color World Map with a globe-circling bird's-eye view.

Carrying Tree Seeds to Iceland

At the very outset of my journey, I felt the impact of Air Age geography. In the short hour between New York's International Airport and Boston I met Dr. Sturla Fridriksson, a young Icelandic forester. He was homeward bound with small bags of tree seeds collected in Tierra del Fuego, on South America's southernmost tip.

"Why go so far for tree seeds?" I asked.

"That's simple," he replied. "Tierra del Fuego occupies a position in the Southern Hemisphere similar to Iceland's in the Northern. Both have cold, windy, wet climates. But Tierra del Fuego has forests; Iceland doesn't. With these seeds we are going to try to grow some trees at home."

In Boston our Pan American World Airways Constellation picked up a brave little pair of displaced persons, displaced in reverse because they were bound to, rather than from, Europe. Fred and Martha Ball they were, orphans from Worcester, Massachusetts, flying to Norway to live with their grandmother and aunt.

Fred's 11 years didn't seem to fill his felt hat and military-type topcoat, both of which were stiff with obvious newness. Nine-year-old Martha, or Sister, as Fred called her, clutched a doll in her arm as she came aboard.

From Massachusetts' golden-domed State House, on Beacon Hill, to Cape Ann, Fred sat with me, poring over my map as it pointed out Winthrop, Revere, Lynn, Swampscott, Marblehead, and Gloucester on a rock-bound coast that had lost its sternness in the hazy dusk of New England's spring twilight. Stewardess Eleanor Gabunas and Sister, like women everywhere, suffered no dearth of conversation.

Hours later over Nova Scotia and Newfoundland we saw the single lights of farm dwellings that spoke of loneliness. Like the embers of a dying campfire, the lights of an occasional village shone up at us.

Our first of two North Atlantic stops was Gander, Newfoundland.* Light snow and field attendants who blew into their hands to keep them warm contrasted sharply with the New England springtime.

Smoke Marks Hekla Volcano

Next morning after we had breakfasted and refueled at Iceland's Keflavik Airport, I saw long-familiar place names come to life: Reykjavik, capital city for the little nation's 142,000 citizens; Thingvellir, an almost indistinguishable clump of two or three dwellings at the head of a lake; Hekla, the volcano, marking its position with a banner of smoke; and Vatna Jökull, Iceland's vast glacier,

* See, in the National Geographic Magazine: "Newfoundland, Canada's New Province," by Andrew H. Brown, June, 1949; and "Newfoundland, North Atlantic Rampart," by George Whiteley, Jr., July, 1941.

 National Geographic Photographer J. Baron Roberts

Eleven Feet of Ticket for 31,000 Miles of Flying

Newman Bumstead, who helps make the National Geographic Society's maps, here prepares to fly around the globe. He devoted a solid month to preparation, selecting 30 stops and fitting them into airline schedules. The 10-color World Map accompanying this issue illustrates his trip. The author encountered temperatures ranging from freezing in the North Atlantic to 112° in India. These extremes presented a clothing problem, but he kept his luggage below the 88-pound limit. Pan American's Margaret Russell sells the complete ticket in Washington, D. C. Its cost: $1,943.10.

smooth and dazzling-white like new-fallen snow in winter sunshine.

I had come into the upper left-hand corner of The Society's map of Europe and the Near East, on a larger scale than the Top of the World map I had used from Boston.

We passed the Faeroes rising sheer, rocky, brown, and barren from the North Atlantic. Soon we glimpsed Bergen, Norway, and, beyond, the inner reaches of Hardanger Fjord, which came into view just before we landed at Oslo (page 714).

Strange Tongues Cause Embarrassed Silence

From the terminal building ran a little boy, sputtering Norwegian greetings to his American cousins. Only a word or two in English from Fred were required to establish the fact that there was no understanding either way. Exuberant good cheer was quickly displaced by silent awkwardness.

It was in the crowd at customs that I last saw them, Fred with his felt hat and military topcoat and Sister clutching her doll. Beside the grandmother they stood, mute and alone—oh, so alone, I thought.

But I hadn't reckoned with the adaptability of youth that was so evident in Fred's letter, received a few weeks later in Karachi: ". . . . Thanks for the chocolates. Yesterday was May 17th, Norwegian Independence Day. We had a parade, and everybody was yelling 'Hurrah.' Having lots of fun . . . . P. S. When you write your children, give my regards. P. P. S. Give Sister's regards, too. Fred Ball."

Early on a Sunday morning, in mist that bore a tang of the sea, I watched

International News

London's Oily Traffic Lanes Weave a Dark Pattern Around Trafalgar Square

Horatio Nelson's 184-foot monument dominates the scene. Battle lamps that lit his flagship at Trafalgar now burn on the square. The Mall begins at Admiralty Arch (lower right). Left: the National Gallery and, facing it, St. Martin's in the Fields.

Oslo take to the woods and snow of Holmenkollen, where the skiing events of the 1952 Olympics will be held in February. With skis, rucksacks, and bright, shiny faces, quick-stepping young people from seven to seventy funneled into the subway which connects with the hill-climbing Holmenkollen line.

What impressed me was the contrast between Oslo's snowless streets and the holiday crowds dressed in winter sports clothing.

Standing near me at the subway entrance was a friendly young fellow wearing blue knickers and knee-high gum boots. He peered expectantly into approaching faces.

"Where are you going?" I asked him.

"To walk in the forest," he answered in English.

"Alone?"

"No. With a friend."

She appeared in a few minutes, wearing a similar outfit: knitted cap, blue knicker suit, rucksack, and knee-high gum boots.

With a "cheerio" and smiles to me they were off, arm in arm. In 20 minutes they would be in snowclad wilderness.

By subway and electric line (its cars permanently fitted with ski racks) I went from sunless, snowless streets to Frognerseteren, 1,371 feet up. In bright sunshine I watched skiing, hiking, and just plain loafing on beds of fir boughs laid in the snow.

The way to Frognerseteren led through hillside Holmenkollen, an area of fine residences that look out over the city, Oslo Fjord, and the mountains beyond.* I saw homes like

* See "Norway Cracks Her Mountain Shell," by Sydney Clark, NATIONAL GEOGRAPHIC MAGAZINE, August, 1948.

TOM Gilbert Grosvenor

Schools Close and Children Cheer; the 17th of May Is Norway's 4th of July

Norway's Constitution was signed on May 17, 1814. In Oslo thousands of school children celebrate the day by marching to the Royal Palace for review by the King. These young flag waivers, having finished their part in the parade, join the cheering onlookers.

Hänsel and Gretel gingerbread houses, weathered to a soft brown, roofed with sod, and capped with a foot-thick layer of snow.

Next morning I sought democratic, 14-year-old Prince Harald at an Oslo public school where he mixes freely and on equal terms with boys and girls from all walks of life.

"Of course you may see him," said Dr. Bjørje, the principal. "Just stand here. He will be one of the boys who change classes on this floor in a few minutes."

"But which one?" I asked as the students poured from their classes.

"No, I won't tell you that," said Dr. Bjørje with a smile. "The fact that you can't pick him out is proof that he is part of the group, a condition that would cease to exist should we display him to visitors."

Prompted by an interest in the ability of Norwegians to speak English, I suggested observing an English class. Suddenly, to my surprise, I found myself seated on a platform in front of 25 girls, all pretty, all giggling.

And how do they learn English? For an hour they read selections from an American edition of O. Henry's *The Trimmed Lamp* in English, then in Norwegian, followed by a discussion of the plot in English and French.

From Oslo Fjord to Copenhagen

"We fly south to the mouth of Oslo Fjord and then head straight for Copenhagen," said Capt. John Christiansen next day as he penciled his course on my map.

The route lay along Sweden's Kattegat coast to Øre Sund, the three-mile-wide bottleneck between Baltic and North Sea waters through which slipped warships of the German fleet for the invasion of Norway in 1940.

Arriving in Copenhagen (København) late in the morning, I went straight to Amalienborg Palace to see the noontime changing of the royal guard.

Beside me stood a middle-aged man, hatless, wearing a weathered trench coat and carrying a brief case.

National Geographic Photographer Maynard Owen Williams

To Win Her Prince, the "Little Mermaid" Sought Human Form and an Undying Soul

Failing in her quest of love, the fairy tale mermaid was changed to a daughter of the air. For 300 years she must diffuse the scent of flowers all around; only then can she gain a soul and the joys of mankind. Copenhagen's bronze statue immortalizes Hans Christian Andersen's princess of the deep.

"Nice morning," I ventured, thinking he might be an English-speaking Dane. He was.

"It's not morning. It's afternoon," he responded.

Seven-and-a-half-hour Conversation

Thus began a conversation with newspaperman Aage Birch that lasted seven and a half hours. It impressed me with the friendliness of the Danes and the pride and love they feel for their capital.

For half an hour we talked while guards wearing big, bushy, bearskin hats clomped on the cobbles of Amalienborg Plaza.

For two hours we talked while we lunched at Tivoli Gardens.

Tivoli has no exact counterpart in the United States, but nevertheless it strongly suggests the American scene. Take a "Boston Pops" concert, a touch of Coney Island, the playground of a well-managed private school, the summer music festival from Tanglewood in the Berkshires, stir thoroughly, sprinkle with sidewalk cafés and friendly, hearty, soft-mannered Danes of all ages and from all walks of life—this isn't the exact Danish recipe, but it may suggest the flavor.*

We talked on the bus back to the hotel.

"You must be tired, but you should see New Harbor," pleaded Birch, his pride in Copenhagen getting the better of his concern for my stamina, which was suffering not at all.

So we talked our way along New Harbor's three blocks, lined almost solidly with pubs. From one came the strains of *Good Night, Irene*.

In the Church of Our Saviour, around whose steeple winds a corkscrewlike staircase, we ceased talking. At the altar Povl Andersen was taking Inge Jensen to be his bride.

"Could you go on for another half hour to

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "2,000 Miles Through Europe's Oldest Kingdom," by Isobel Wylie Hutchison, February, 1949; and "Royal Copenhagen, Capital of a Farming Kingdom," by J. R. Hildebrand, February, 1952.

Sled Dogs Pant, Skiers Sun-bathe 11,000 Feet up in Swiss Sunshine

Jungfraujoch, in the Alps, offers year-round snow sports. Europe's highest railroad, tunneling most of its 5.8 miles through solid rock, takes visitors to the scene. Here the author met a scientist in ski costume who was burying cosmic-ray test plates in the snow (page 723). These huskies are descendants of 20 dogs brought from Greenland in 1912 with the help of Roald Amundsen.

▼ Earth's Steam Makes Electricity in Italy

Volcanic steam jets turn Larderello Valley into a natural power plant. Some of these vents have been capped and harnessed to turbines driving generators.

The author, flying over Pisa, spotted Larderello's spool-shaped concrete towers from a distance of 40 miles (page 727). These huge condensers cool volcanic steam to water. After cleaning, the water is reheated by more volcanic steam. This purified steam drives the generators. In 1950 Larderello collected 10 million pounds of boric acid and borax as by-products from the steam-cleaning.

Italy obtains a twelfth of her power from Larderello. With almost no coal, she depends on water power for 88 percent of her electricity. Drought, a hazard to hydroelectric plants, has no effect on Larderello's steady output.

National Geographic Photographer
Willard R. Culver

see the Round Tower, where Peter the Great is believed to have driven his horses up the spiral stairway?"

So on we went and on we talked as Birch showed me Copenhagen like an art collector displaying his choicest treasures.

Finally, at 7:30, we stopped in front of my hotel. I thanked him profusely, shook hands, and said, "I'll see you again, Mr. Birch."

He paused, gripped my hand, and smiled, "No," he answered, realistically, "no, you won't."

He turned, and the gray, hatless head, the shabby trench coat, and the brief case disappeared in the crowd.

Over Blasted Helgoland

For well-known and easy-to-spot geography, it would be difficult to surpass the 15.2 inches between Copenhagen and London on the National Geographic's map of Western Europe.

First the distinctive forms of Danish islands came into view, matching themselves one by one with their names on the map. For 10 minutes we flew over Schleswig's narrow neck; next came Helgoland.

Here on April 18, 1947, with a Bikinilike blast of 6,700 tons of explosives, the British Navy demolished the German batteries and submarine pens of this tiny island which, during two wars, had been a thorn in its side.

The Frisian Islands' unmistakable shapes flashed beneath us, followed by the 20-mile dike between the fresh water of Zuider Zee (IJsel Meer) and the North Sea's briny deep.

After some 40 miles over the North Sea we sighted the Kent coast, Canterbury, Epsom Downs Race Course, and finally London, sprawling and smoking on the banks of the Thames (page 707).*

I was greeted at the airport by Robert J. Reynolds, of The Society's staff, who had flown the Atlantic nonstop to Ireland a few days earlier. His time between New York and Shannon Airport, 13 hours, reminded me of a prophecy made by Alexander Graham Bell in the NATIONAL GEOGRAPHIC MAGAZINE 38 years ago (June, 1914, page 665).

"Calculation shows that . . . . our best machines should be able to cross the Atlantic in 13 hours," said Dr. Bell.

So visionary did the distinguished inventor regard the prediction that he added, "I hardly dare to say it aloud for publication."

Bob and I visited the Houses of Parliament (page 715), where we heard socialized medicine debated. Amplification is by "soft" speakers instead of the usual "loud" variety. In the backs of the gallery benches amplifiers operate at a very low pitch, which doesn't disturb the M.P.'s on the floor.

Westminster Abbey's hoary interior walls were being cleaned. Although the Stone of Scone had recently been retrieved from Scotland, it was not in evidence, but we were shown its historic resting place under the seat of the Coronation Chair. Here, since the crowning of Edward II, this block of sandstone has figured in six centuries of English coronations. It made its first trip from Scotland in 1297.

At Lloyds in Leadenhall Street we lunched in the Captains' Room. The name stems from the days before wireless, when returning ship captains were wined and dined while they reported directly to their underwriters. In this world-famous institution, insurance has been, and is, written on risks varying from a £100 policy on Napoleon's life to a National Geographic Society stratosphere balloon or San Francisco's cable cars.

One evening we walked to Grosvenor Square to join Sara Revis, of the American Embassy staff. In her tiny English car we drove to Windsor Castle, where on the following day Frederik IX of Denmark was to be made a Knight of the Garter. From the castle's heights we watched the sun go down into the peaceful green countryside, green as only England in the spring can be green, I thought.

Through Eton we drove as boys with blue caps and shin guards were leaving the cricket field. On the Thames at Marlow bridge we dined at the Compleat Angler Inn whose name reflects the popularity of the region with modern Izaak Waltons. Stately white swans, the King's property, swam in the river.

Next day, standing alone on Westminster Bridge over this same Thames, I listened to Big Ben bong out the hour into the gray London morning. Here I sensed the intensity of British tradition.

The Netherlands' Miami Beach

Flying to Amsterdam, I sat with P. R. Moenking, a Dutch carpet merchant. He pointed out the Hook of Holland (Hoek van Holland); the big port of Rotterdam; The Hague ('s Gravenhage), seat of his country's Government; Leiden, the university city; and the North Sea resort of Noordwijk aan Zee.†

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "The British Way," by Sir Evelyn Wrench, April, 1949; "Yanks at Westminster," by Capt. Leonard David Gammans, August, 1946; "London Wins the Battle," by Marquis W. Childs, August, 1945; "As London Toils and Spins," by Frederick Simpich, January, 1937; and "Some Forgotten Corners of London," by Harold Donaldson Eberlein, February, 1912.

† See, in the NATIONAL GEOGRAPHIC MAGAZINE: "Mid-Century Holland Builds Her Future," by Sydney Clark, December, 1950; and "Holland Rises from War and Water," by Thomas R. Henry, February, 1946.

  Photograph by John E. Fletcher

A Modern Phileas Fogg Maps His 80-day Trip Around the World

Unlike Fogg, Jules Verne's fictional 80-day wonder who circled the globe by ship, train, elephant, and sled in 1872, Newman Bumstead (right) spent only six days in elapsed travel time. By flying, he conserved 74 of his 80 days for sight-seeing in 24 lands and territories.

Mr. Bumstead, National Geographic research cartographer, took with him a set of The Society's 10-color maps. They served him as airborne signboards. Using the recent map of Western Europe, he identified rivers, mountains, and cities with ease. Highlights of history printed on the Classical Lands and the Bible Lands maps illuminated his Mediterranean tour.

Here Mr. Bumstead outlines his global route to James M. Darley, The Society's chief cartographer. Red pins in the World Map represent ground stopovers; yellow pins, refueling stops.

The painting reproduces in oil a photograph of a square-rigged bark. Entitled *Argosy of Geography*, the picture was made in the Caribbean 11 years ago by John Oliver La Gorce, Associate Editor of the NATIONAL GEOGRAPHIC.

Norway in the Spring. Blooms in the Forest [illegible] the Narcissus

[illegible]

[illegible]

London's Big Ben Boomes the Hours over the Houses of Parliament

George VI Passes the Houses of Justice on His Way to Open the Festival of Britain

Rockefeller's Bagel-Brick Festival Resembles a Gargantuan Gulp

[illegible]

Gertrude Girls Display Garments Made from Moscow Dungarees

[illegible]

Puerta de Alcalá, a Relic of Madrid's Old City Wall, Stands Like a Gate Without a Fence

On the [illegible] it was surrounded by 20-foot-thick masonry. Three gates survive. One of them is Alcalá [illegible]

Besieging Parisians Rush Scanning the Letters — See Their Pass

Building St. Peter's: Michelangelo Refused Pay, Saying He Worked Only for Love of God

[illegible]

"Like your Miami Beach—lots of hotels and people spending money. All but the weather," he laughed.

At Amsterdam's Schiphol Airport I saw General Eisenhower's plane, *The Columbine*, and beside it a staff array of Dutch and American officers waiting to see the General off. He was due to depart in a few minutes.

The few minutes lengthened to 20, to half an hour, to an hour, but still no General. The officials lost their stiffness, even smoked cigarettes.

Suddenly he arrived in a shiny black Ford sedan. From the driver's seat jumped Lance Corporal Gerard Peters, coming smartly to attention. General Eisenhower stepped out the other side. While the high-ranking officers waited (again in proper, staff array), he walked around the car to speak a few smiling words to the Lance corporal.

"That's what we like about him," said the cab driver at my side.

On one of Amsterdam's passenger-carrying canalboats I met Hank Verbeekmoes, who took me to Edam. To see cheeses? No, to visit his ceramic studio, where I saw a dinner set destined for a Chicago family.

We spent the afternoon sailing on the Zuider Zee in a *botter* (butter) boat. This stubby fishing craft, unique in the Zuider Zee, is about 40 feet long, nearly a third as wide. As I crouched in its pitching cabin, too small for me to stand erect, my thoughts were of Winken, Blinken, and Nod and their experiences in a wooden shoe.

Bells Chime a Challenge

Back in Amsterdam that evening I paused on a busy street corner to hear the chimes of the Royal Palace clock. Hank had told me of their song.

"Beware how strong we are," its words warn, referring to the citizens of Bergen op Zoom, in southern Holland, who centuries ago repulsed invading Spaniards.

Near by a tall, well-groomed police officer, wearing both sword and pistol, stood with dignity beside his mount, a bicycle.

"What are the bells saying?" I asked him.

He began to answer me in merger English.

"Isn't it something about 'how strong we are'?" I prompted.

"You know about that, do you?" he exclaimed in surprise, and his face lit up with warm approval of the foreigner who knew this proud bit from his country's past.

Our flight from Amsterdam to Frankfurt led up the Rhine over the smoking, industrial cities of the Ruhr. "Old Flak Alley," said Pan Am copilot George Smith, formerly of the Eighth Air Force.

At Frankfurt I had lunch and an hour of pleasant talk with Frederick G. Vosburgh and Volkmar Wentzel, there on editorial assignment for the NATIONAL GEOGRAPHIC, and reported for Darmstadt with the latter, who was to be my interpreter for a few days.

Visiting an "Adopted" Church

I went to Darmstadt to visit the people of St. John's Parish which was "adopted" in 1948 by my church in Washington, D. C., the Chevy Chase Presbyterian (page 717).

On the night of September 11, 1944, 250,000 incendiary bombs and hundreds of high-explosive bombs were dumped on Darmstadt, important producer of scientific instruments, chemicals, and machinery. Through death and desertion its population shrank from 115,000 to 40,000. The church was gutted.

The welcome given me by St. John's minister, stocky Dr. Hans Orth, was spoken with a sincerity that needed no interpreting.

He showed us the new parish hall, built from rubble, much of which was cleaned and stacked by children. To encourage these young workers, prizes of soap were awarded. Chevy Chase children, on the previous Halloween, had collected this soap for Darmstadt's needy instead of applying it to cars and windows.

As we were finishing dinner in the home that evening, Dr. Ludwig Metzger, mayor of Darmstadt for five years following the war, joined us with his wife.

"Tell me about the bombing," I urged. "Were you and your family in the midst of it?"

With some reluctance he began to talk. On that particular night he was away. His wife and one son of 8 years were at home in Darmstadt. The elder son, Gunther, then 11, was visiting on a farm 14 miles from the city.

Awakened by the thunderous noise, the people on the farm watched the terrible scene.

Gunther started running toward the barn.

"Where are you going?" demanded the farmer.

"To get my bicycle. I must go to my mother and brother. They are alone."

He was sent back to bed. But later, unnoticed this time, he slipped away and rode off into the night. By dawn he had reached the smoking ruins. His mother and brother had disappeared. Finally, after searching, he found them unharmed in a near-by village.

Recollecting Dr. Metzger's story, I see not his boy, Gunther, but my own 11-year-old son, John, riding home through the awful night and war's tragedy becomes real and personal as nothing else has made it.

From Darmstadt Wentzel and I drove through New England-like Bavaria to Rothenburg on the Tauber, a medieval walled

Tenor Lauritz Melchior and the Author Met on the Clipper *Good Hope* over Germany

[illegible]

[illegible] and edibles that must have [illegible] a [illegible] dictator.*

In 1631 General Johann Tilly [illegible] Rothenburg [illegible] its stubborn resistance. Tilly ordered the councilmen hanged. At last he promised mercy if any Rothenburger could drink at one draught a [illegible] of wine. [illegible] Rothenburg's [illegible] history [illegible].

The [illegible] Rembrandt painting [illegible] mingled with musket shots and the ringing of the town's bells [illegible] that Wehrmacht [illegible] back to the year [illegible], when the [illegible].

Another admirer of Rothenburg is John J. McCloy, U. S. High Commissioner for Germany, who as Assistant Secretary of War spared the town from shelling during World War II. In appreciation after the war, Rothenburg made McCloy an honorary citizen.

Twice during the 80 days of my trip it was necessary to alter the schedule. Once this resulted in a longer stop in Pakistan, and the other time in a [illegible].

Paris, of all places, was the short stop. Here, with Paris celebrating her 2,000th birthday, I had time enough only to realize the [illegible].

What John Adams Thought of Paris

As I sipped coffee in a sidewalk café on the Champs Élysées, I found myself in full sympathy with John Adams when he wrote his wife [illegible] from here in 1778: "I admire the Parisians prodigiously. They are the happiest people in the world, I believe, and they have the best disposition to make others so."

For the most part, I had to content myself with a drive through the Bois de Boulogne, a trip to the top of the Eiffel Tower, a visit to the Arc de Triomphe with its Eternal Flame, and a few other standard attractions (page 20).

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* See "Rothenburg, the City Time Forgot," by Charles W. [illegible], NATIONAL GEOGRAPHIC MAGAZINE, February, [illegible].

[illegible] "[illegible]," [illegible] NATIONAL GEOGRAPHIC MAGAZINE, July, [illegible].

A flying trip to Montmartre, still a show place despite its comparative loss of prestige as an art center, was rewarding enough, if only for a visit to Sacré Coeur, which crowns its heights.

I have more reason than the average traveler for wanting to see Paris again.

Next stop was Switzerland. I had been in Geneva just over an hour when I engaged a Swiss driver, big John Pinget, who drove his car with one hand while he talked to me with the other. I asked him his weight.

"About 100 kilograms," he answered.

"And how much would that be in pounds, John?"

"Pounds?" he pondered. "I don't know, but it would be something over sixteen stone."

John was quite as unable to change his weight from kilograms to pounds as the average American is to change his from pounds to kilograms. The 100 kilograms came to 234 pounds—a calculation I did not take time to make on the spot.

While John showed me the United Nations Palace, formerly the League of Nations Palace, and the headquarters of the International Red Cross, I pressed him for some more personal aspects of Switzerland.*

"How about a school?" I asked.

"It's too late now, and tomorrow is Thursday," he replied with puzzling finality.

"What's the matter with Thursday?" I persisted.

John explained that children in Geneva Canton don't go to school on Thursdays and Sundays. This system was devised to give parents who have Saturdays off a vacation from children as well as from work.

$4,000 Pocket Watch

In the showrooms of the Galonin Watch Company in Geneva I saw a pocket watch which was about to be delivered to President Juan Perón of Argentina. It indicated the second, minute, hour, day of the week, date, month, and phase of the moon, not forgetting to add the 29th of February every four years. It struck the hours, quarter-hours, and minutes. Two stop hands permitted the timing of two horses, selecting and automatically holding the faster time. Price: $4,000.

The rack-and-pinion railway to 11,340-foot-high Jungfraujoch leads up from the village of Lauterbrunnen and a valley of hanging waterfalls. On an afternoon when Jungfrau and its lofty neighbors were hidden in gray clouds, I walked alone in the valley. Like night wind in the pines, the sad sighing of waterfalls was a soft undertone for the cheery tinkling of cowbells.

†In the railway angling skyward, I rode up to Jungfraujoch in the eternal Alpine snows (p. 710). Beside me sat young Asoka Gunasekera from Colombo, Ceylon, who, with his father and sister, was visiting Switzerland. No sooner had he heard I was an American than he pressed me with a vital question.

"Do Hopalong Cassidy and Gene Autry ever speak to each other?" he asked.

I tried to set Asoka straight without disillusioning him and wondered, as we talked, just what difference one could actually find between a Ceylonese boy reading comics and his American cousin similarly engaged.

Clouds Veil Jungfrau's Face

Below us sunshine filled the valleys. Above, clouds covered the peaks, and we speculated on the chances of a view (which I have yet to see) from Jungfraujoch.

"You've been skiing?" I asked a young man who wore a jaunty ski outfit.

"Not this trip," he answered. "I am up here in connection with a study on the primary particles of the cosmic ray."

He was Dr. Hans Bichsel, of the Physical Institute of the University of Basel, and explained that he had just buried some sensitized plates in the snow where, for a number of weeks, they would remain to record the cosmic-ray effects tested in the study.

Flying from Geneva to Barcelona, I talked with photographer Dave Pratt of the International Refugee Organization.

"I see a lot of your maps in my travels," he volunteered. "I have photographs of refugees poring over them in our camps."

Again my map of Western Europe identified the scene below. We flew down the Rhône to its westward bend toward Lyon, met it again near Avignon, and finally left it where it meets the blue waters of the Mediterranean between Montpellier and Marseille.

We picked up the Spanish coast at rocky Cape Creus and followed it to Barcelona. Here and there fishing nets spread out on the sand appeared like mammoth nylon stockings laid out to dry.

Building Boom in Madrid

In Barcelona we changed planes. Dave Pratt went to the Island of Mallorca for a fortnight's vacation, I to old Madrid.†

In Madrid I found Spain's second skyscraper under construction. The builders plan to have it ready for partial occupancy in 1952. A product of Spanish enterprise, engineers, and materials, the 26-story concrete structure is properly called the España Building.

* See "Switzerland Guards the Roof of Europe," by William H. Nichols, NATIONAL GEOGRAPHIC MAGAZINE, August, 1950.

† See "Speaking of Spain," by Luis Marden, NATIONAL GEOGRAPHIC MAGAZINE, April, 1950.

Mosques and Motor Ad Preachers Old and New in Istanbul

Baghdad, Straddling the Tigris, Basks in Desert Heat

[illegible]

Both Home and Ferryboat Is This Twelve-foot Craft

[illegible]

[illegible] apartments of [illegible] rooms and a luxury hotel [illegible] called the Plaza. A [illegible] of [illegible] and [illegible] on the roof of the España Building, we counted 10 large construction jobs, most impressive of which was the new Air Ministry Building. But, despite [illegible] building [illegible], Madrid continues to look [illegible] with a patchwork of mellow tile roofs [illegible] which the new blends well with the old [illegible]

In the splendid [illegible] Higher Council for Scientific Research [illegible] of United States Government publications. Two especially, [illegible] *South Great Fishes* and *Indians* [illegible] *Dictionary Russian Russian* [illegible] a textbook [illegible] the [illegible] of [illegible]

At the University of Madrid I spent [illegible] talking with students. Many of them aspired to [illegible] Americans [illegible] salaries are higher and [illegible] work less.

Youthful Dental Student Serves as Waiter

When [illegible] left for [illegible] dissatisfied [illegible] the Literal Table. [illegible] upper [illegible] under his [illegible], reached almost to the floor. He was Luis Ripoll, 24 [illegible]

[illegible] Luis [illegible] job. He was working from [illegible] with Sundays off. He [illegible] to salary only [illegible] because [illegible] [illegible] a good week [illegible] [illegible] second [illegible]

What [illegible] to be when you grew up? [illegible] I asked.

[illegible] to [illegible] his [illegible].

When Luis was 8, he began to work with his father [illegible] dental technique. When he was 10, his father died. Luis [illegible] to find other work.

[illegible] dentistry [illegible]

[illegible] for [illegible] and [illegible]

[illegible] except [illegible] which [illegible] Sundays afternoons to hire a bicycle for an hour.

I backtracked to Switzerland and boarded

TWA's New York-to-Rome flight

For several minutes we circled over Geneva to gain altitude.

Leaping Lofty Mont Blanc

"Just [illegible] yourself [illegible] [illegible] those [illegible] flowers," said Captain Tom Dyer, looking toward the Alps.

A few minutes later we were safely above and making a leap around Mont Blanc's snow-capped 15,781-foot summit.

"That little [illegible] on Mont Blanc is a weather station," explained the captain.

"You know," he said [illegible] for my map, "I studied geography like [illegible] schoolboy. But I didn't really become interested in it until I began to [illegible] about some of the places I fly over."

An Air View of Pisa's Leaning Tower

He penciled our route on the map. It led from Mont Blanc to Turin in the Po Valley, to Columbus's home port, Genoa, to La Spezia, the navy's base with its threadlike [illegible] water separating the glass-smooth harbor from the waves of the [illegible] Sea [illegible] to Pisa.

"There [illegible] right down there. See it [illegible]?" said the captain, pointing to Pisa's tower.

We looked up from the ancient [illegible] and, [illegible] to the south, we saw the [illegible] cone-shaped concrete cooling towers of the Larderello Valley volcano-harnessing project.

Larderello Valley, like Alaska's Valley of Ten Thousand Smokes, is an area of active volcanic [illegible]. Steam from [illegible] been trapped and piped to steam turbines which drive generators that are now producing one-twelfth of Italy's electric power (page 711).

To our left we saw Elba [illegible] at land, and Corsica in the hazy distance. Rome was [illegible] 100 miles ahead, and we were already descending to land.

Below were many mountaintop castles which would be difficult to spot but for the narrow trails or roads that lead to them.

7,100 Miles to Grandmother's House He Flew!

[illegible]

"Look for St. Peter's, Victor Emanuel's Monument, and the Colosseum!" [illegible] McMills.

In Rome I was joined by NATIONAL GEOGRAPHIC staff photographer J. Baylor Roberts, who, with his camera, was to complete the world circuit with me.

Amid the crumbling ruins of the Roman Forum I listened while 15-year-old Sylvia Taglianozzo compared her life in Rome with her life in Norton, Massachusetts, where

[illegible]

two years before, her father was teaching Italian history.

She told me that while it's quite all right for a professor's daughter to baby-sit or work at a soda fountain in Norton, it just isn't done in Rome. In Norton things are better planned for fun; in Rome there is more emphasis on the serious aspects of preparing for a career.

Early one morning as we flew from Rome on Italy's "shinbone" to Otranto on her "heel," I read history in the terse notes of The Society's map of Classical Lands.

Anzio—Old and New History

Thirty miles south of Rome I spotted Anzio, on a peninsula which resembled a blunt sawtooth. Of this place, whose name Americans find difficult to utter without the word "beachhead," a map note said:

"Birthplace of emperors Caligula and Nero, A.D. 12 and A.D. 37."

Of Vesuvius, basking innocently in the morning sunlight, I read of past "crimes":

"Volcanic ash from Vesuvius sealed houses and preserved their furnishings" (reference to Herculaneum); and "Buried by Vesuvius, A.D. 79" (reference to Pompeii).

I saw tiny villages on Italy's heel which, with their white houses, resembled clusters of salt crystals sprinkled at random on the suede-colored landscape. Finally Otranto, Italy's easternmost city, slipped beneath us, and we were bound southeast toward the narrow neck of water that separates the Peloponnesus from the Greek mainland.

Consisting of the Gulfs of Patraikós and Korinthiakós, this waterway leads to the canal named for the city of Corinth (Kórinthos) which, according to another map note, was "important commercially by the 8th century B.C."

In the steep-sided canal I saw a freighter saving 600 miles by avoiding the trip southward around the Peloponnesus.

When I had finally accustomed myself to the fact that the big expanse of city extending inland was not Piraiévs alone but Athens and Kallithéa as well, we were about to land. My eager eye glimpsed only the Acropolis and Lycabettus (opposite page).

By royal proclamation, King Paul declared 1951 a year of homecoming for all Greeks living abroad. One such homecomer was Peter Nicholson, a real estate man in Detroit, Michigan.

He left Greece in 1914 at the age of 17 and, after a voyage of 28 days, landed in New York with ". . . about $20 in my pocket, shoes but no stockings, and I couldn't speak a word of English."

Two days after I talked with him, this man was decorated by Prime Minister Venizelos for helping organize in the United States, groups of Greeks who accepted the King's homecoming invitation. On the following day Peter Nicholson went again to New York—this time in 28 hours by air.

Parthenon? There's One in Nashville!

On the Acropolis I talked with Ensign George Bates of the destroyer *U.S.S. Gatard*, moored in Piraiévs.

"We have one just like it back home in Nashville," said George, referring to the full-sized reproduction of the Parthenon built for the Nashville Centennial Exposition of 1897 and rebuilt permanently in 1922.

From Athens we flew northeast over the Aegean Sea, a bit of Anatolia, and the Sea of Marmara to Istanbul.*

"Is that the Bosporus?" asked Joe Roberts.

My [illegible] assured him it was.

"Why [illegible] wider than the Mississippi [illegible] New [illegible]," he [illegible]

Joe had no such handy comparison for Istanbul's Blue Mosque, nor had I. Standing in our stocking feet on the richly carpeted floor, we listened as the shrill voices of two boys filled its lofty dome with the words of the Koran. And the words echoed back on themselves from the blue tile walls—the same words, the same blue tile walls that have known each other for more than 300 years.

When at lunch our Turkish driver refused another helping with "Praise Allah, OK," I wondered if perhaps East and West were at least beginning to meet.

From the top of Galata Tower we looked out on the Golden Horn (page 724), busy with shipping; Galata Bridge handling a 5-o'clock rush, and Istanbul's minaret-studded skyline silhouetted against billowing white clouds and the Sea of Marmara.

The men who sleep in hammocks in the top of this 1,400-year-old tower and watch for fires in the city below seemed at first to share our enthusiasm for the view as they offered us field glasses.

"Look to your hearts' content, but make no pictures," was the substance of their gestures.

Over Classic Lands to Cairo

Flying from Istanbul to Cairo, I again read history, this time from The Society's Bible Lands map.

"Alexander cut the Gordian knot," said the red type, with an arrow pointing to a spot 50 miles southwest of Ankara. Here the world

* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Turkey Paves the Path of Progress," by Gilbert Grosvenor and Maynard Owen Williams, August 1951; and "Watchtower Greece Looks Ahead," by Maynard Owen Williams, December, 1949.

Mount Lycabettus, Crown of Athens, Is Larger but Far Less Famed than the Acropolis

The Secretary's Aide Map Tourists in Athens's Temple of the Olympian Zeus

[illegible]

[illegible]

[illegible]

"... and the Prince Is Round Like a Ball"

Entrance before St. Hilarion Castle, Legendary Home of Cupid, Mounts Cross over the Enchanted Isle of Cyprus

[illegible]

The Arabian Mount Called Canada Dry, Heads for the Pyramids

[illegible]

[illegible]

A Trouble-free Afghan Hides Moves into Pakistan at Khyber Pass

Women's Heads Bear Tons of Salt as Diggers in Karachi Harbor

In Swat, Oxen Thresh the Wheat by Hoof, Men Tamp the Straw by Foot

Swat is a small state in Pakistan. Its ruler, entertaining the National [illegible]

When Clouds Blotted Out a Moonlight Study of Agra's Taj Mahal, the Photographer Slept on the Grounds Awaiting This Sunrise View

Selingal Cases, Abandoned by Ships Unable to Raise Sit-embedded Vessels, Cover the Banks of Calcutta's Hooghly River

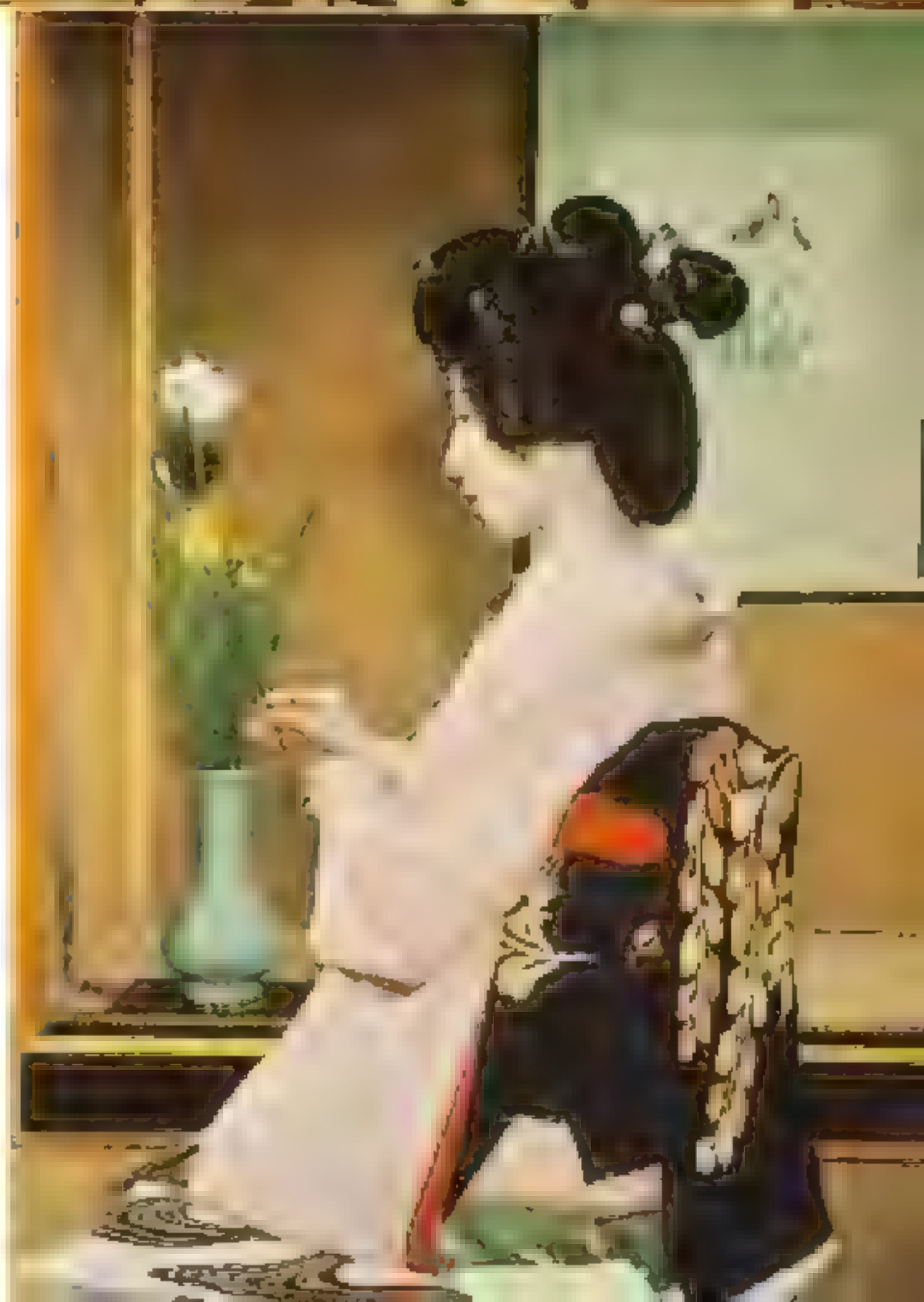
Early Morning's Market Glides on Bangkok Canal with Produce Boats

A Chinese Refugee Awake, but Lacks Sleep, Has Possession of Nothing Else

[illegible]

Hong Kong Looks Dry Once Familiar Sails

[illegible]



On a Rare Day When Waikiki's Breakers Fail to Roll, Outrigger Canoes and Surfboard Riders Die Idle in the Sea

Hawaiian Swimmers Decked with Leis Cast a Coke Hex on the Air

[illegible]

Day Breaks over the Pacific; Pilot Talks with the Mainland

[illegible]

conqueror, with one stroke of his sword, cut the strangely entwined knot which others had tried vainly to untie, and gave the world a phrase synonymous with boldness.

We passed Konya, home of St. Thecla, who was "taught by the Apostle Paul," as another note recorded.

Just beyond Konya is the site of Lystra where, I read, "Paul stoned and left for dead (Acts 14: 8-19)."

On Anatolia's southern coast rose the Taurus Mountains. The rounded ridges and smooth-rounded valleys of their northern slopes reminded me of the soft folds of skin on the neck of a fat woman.

Port Said and the Suez Canal

As we approached Egypt's coast, shades of dusk made it easy to imagine that the lights of Port Said were the sparkling facets of a precious stone which dangled at the end of a jeweled string.

The string was the Suez Canal and its jewels the lights of ships following one another through the continent splitting ditch as closely as safety permitted. At the string's far end was the faint glow of Ismailia.

Our sojourn in Cairo included a camel-back visit to the Pyramids of Giza and their reticent neighbor, the Sphinx (page 735).

From Cairo we flew across the southeastern corner of the Mediterranean toward ancient Tyre and Sidon. Anchored off Sidon were tankers nursing an oil pipeline overhead 1,000 miles from Bahrein Island in the Persian Gulf.

Beyond Damascus, possibly the world's oldest continuously inhabited city, followed 450 barren and empty miles. We glimpsed a lonely car, tagged by a plume of dust, on the roadless route that leads across Syria to Iraq.

Into view came the clump of small buildings that constitute pumping station H-2 (H for Haifa) on the pipe line that brings oil from the Kirkuk fields of northern Iraq to Israel's Mediterranean coast at Haifa. Then we reached Baghdad (page 725).

Flavor of Anytown, U. S. A.

Searching the city, we at length found a strong flavor of the *Arabian Nights* in the golden domes and minarets of the Mosque of Al Kadhamain. But no searching was necessary to find a stronger flavor of Main Street, Anytown, U. S. A.

In a 5-minute stroll along Baghdad's Al Rashid Street, I saw the following store-front signs: Kaiser Frazer, Kelvinator, Westinghouse, Esso Flit, Lux, U. S. Tires, Frigidaire, Modiboll, Goodyear, Chevrolet, Buick, General Motors, Allis-Chalmers, Federal Tires, Oldsmobile, Pontiac, Plymouth, Chrysler, Dodge, Studebaker, Philco Radio, Exide, Dessoto, Lee Tires, Singer, Cadillac, White, Hudson, B. F. Goodrich, Firestone Tires, Sealed Tires, Kelly Springfield, Coca-Cola, Pepsi-Cola, and International Harvester.

That night, at the Roxy Theater on Al Rashid Street, we saw Esther Williams and Van Johnson in *Duchess of Idaho*.

At Baghdad's airport we watched "Operation Magic Carpet," the airlift which, when we were there, had moved 116,000 Iraqi Jews to Israel. Twenty thousand more would be flown out, an official told me.

The morning we left for Karachi, 88 of these expatriated Jews were boarding a Curtiss Commando plane. They varied in age from nursing babies to an old man who carried a even older woman piggyback to the plane.

On its 9,000-mile way from Amsterdam to Java, a KLM Flying Dutchman picked us up in Baghdad and set us down 10 hours later in Karachi.

En route, we looked down through a dust storm on Babylonia, Basra, and Abadan, renowned for history, dates, and oil refineries, respectively.

Iran's Persian Gulf coast, steep and in places 7,000 feet high, appeared newly eroded like a pile of builder's sand after a summer shower.

Karachi Looks to the Future

In Karachi, the capital of four-year-old Moslem Pakistan, we talked with Government officials who displayed earnestness, determination, and proud optimism of the type associated with the founders of the United States Government.

I talked with some of the Moslem refugees from Hindu India who have swelled Karachi's population from 300,000, when British India was partitioned in 1947, to 1,500,000 in 1951.

Thousands of them were living in rude shelters built along the city's sidewalks. And on the same sidewalks they were busy at many trades: repairing shoes, building furniture, dyeing cloth, and selling food cooked on small charcoal-fired grilles.

"How's business?" we asked harbor official Rassul Sabra.

"Karachi port is very busy. We receive 80 to 90 ships a month, and most of them come here to load," said Mr. Sabra, explaining an important reason for Pakistan's favorable trade balance (page 734).

We flew to Peshawar in Pakistan's North-West Frontier Province, and then drove to the historically sinister Khyber Pass (page 734). Here I stopped a 13-year-old tribesman, Jundali, and asked him, through my interpreter, what he would be when he grew up.

"Surely, for the sake of the State, destiny

[illegible]

Map Talk, an International Language, Makes Brothers of U. S. and Pakistani Cartographers

[illegible] Washington, D. C. [illegible] National Geographic Society [illegible]

[illegible] disturbed [illegible] be answered.

At the [illegible] beyond the pass we lunched [illegible] and later were served tea by [illegible] hospitable Mohammed [illegible] political officer.

I talked to [illegible] tribesmen who [illegible] the British [illegible] with [illegible] and pillboxes, and who, as if to keep in trim, [illegible] the British.

Said one, concerning tribal ethics: "If, when I am entertaining you and am away from my house, my blood enemy should come to get me and find you, he will entertain you. The enmity will go on forever, but the guest will remain a guest."

We were guests of Chief Akbar Shah Khan at his "gun factory" in near-by Kohat Pass (opposite). Here in mud huts with primitive, homemade equipment, tribesmen make exact copies of British and American arms.

No detail of the original is omitted in the copy. Proof marks, manufacturers' numbers, patent numbers, and dates are given as much attention as sights and triggers.

After inspection and a lavish tea, the chief sent one of his men across the road to bring out a new model. In front of what looked to be the entire male population of the village, we fired the rifle at a stone 100 yards distant. Our shots were close, but we scored no hits.

Smiling, the chief [illegible] the [illegible] with his favorite rifle and showed us how, scoring a hit with every shot.

In Kashmir at the cease-fire line between Pakistani and Indian forces, we drank tea with Maj. Zia-ul-Latif of the Pakistan Army. In his account of the early Kashmir fighting he referred to the exploits of the North-West Frontier Province tribesmen and their homemade rifles.

Sleeping on the Taj Mahal Grounds

After reaching Delhi, India, we drove 12[illegible] sweltering hot, nocturnal miles to Agra to photograph the Taj Mahal by moonlight

Pakistan's Rifle Initiators, Who Claim Famous Firearms, Made Trading Impossible

[illegible] felt undressed without a rifle, some have [illegible] Kohat [illegible] to make their own, imitating the best Western [illegible] the rifle bores on [illegible] Chief Arbar Sher [illegible]

arriving at [illegible] 30 a.m. (page 756).* But the [illegible] moonlight was too weak for [illegible] I stretched out on the hard [illegible] and thought of its builder, Emperor Shah Jahan, who, with his beloved wife Mumtaz Mahal lies asleep in [illegible] tomb. And soon I too slept.

Sitting out a Siamese Revolution

[illegible] and were met by a friendly and efficient Pan American official, Lambeth Renstrom. On the way to town he [illegible] that [illegible] weeks and [illegible] other company wives had been ordered back to the States as a precaution because of uncertain political conditions.

"But obviously there was no reason to," said Renstrom. "Nothing has happened!"

[illegible] Renstrom [illegible] official [illegible] that Premier Pibul had been kidnaped and a revolution had broken out.

"Why, they've even thrown up a road block between here and the airport! We'd have seen it if we had looked behind us," he exclaimed.

"But don't worry," continued Renstrom, "there will be a little harmless shooting to-night [illegible] when you wake up it will be all over.

That evening we heard only that the contest was between [illegible] Army and Navy. The shooting [illegible] near enough our hotel to [illegible]

At 3 a.m. the shooting could no longer pass for [illegible] Army Air Force [illegible] and strafing the naval [illegible] to be a check point for the bomb run.

Soon the planes scored a hit on the Navy's oil depot. [illegible] and billowing black smoke filled the sky.

[illegible] from the

* See "India, Capital of a New Dominion," by Phillips Talbot, [illegible] Magazine, November [illegible]

balcony on which we stood, and the guests of the hotel suddenly, and as a group, were seeking shelter in the cellar. But when we found there was no cellar, we went out on the open terrace and had breakfast.

Throughout the day, Bangkok rocked with artillery fire, rifles banged back and forth, and Army planes continued their zooming attacks on the Navy's ships in the river and its tributaries beyond.

Peace Descends on Bangkok

Things looked better next morning. Premier Phibul, who had been held captive on a warship, had swum ashore to safety when the vessel was hit and set afire. Casualties on both sides rose to 68 killed and 1,160 wounded, but the Premier was again in control of the Government and Bangkok was once more its friendly, peaceful self. Quiet settled over its temples with their gracefully curving roofs of tile and gilt.*

In a sampan traffic jam in one of Bangkok's floating markets, we watched paddling [illegible] (page 739). I saw sampans loaded with fresh bread and hot coffee; with pots and pans; with ice cream; with toys; with cloth and sundries; with betel nuts; with pineapples, with the morning's mail; and even with bright-eyed slate-carrying school children.

Using The Society's map of Southeast Asia, BOAC Capt. Steve Gordon showed me how our course to Hong Kong would be bent to [illegible] flying over Red China's Hainan Island.

"Going to stop in Hong Kong?" began a young man, seating himself across the aisle from me.

[illegible] quickly produced a copy [illegible] NATIONAL GEOGRAPHIC.

"[illegible] is, then," he advised, pointing to "Trawling the China Seas," an article on the Hong Kong junk fleet by J. Charles Thompson.

Aloft, I watched our progress on the map. First came the Mekong River, telling me we were leaving Thailand and entering Laos, Indochina. A ridge of mountains passed below, indicating, approximately, the Laos-Viet Nam frontier.

During a two-and-one-half-hour flight over the South China Sea, we skirted, at a good 20 miles, Red China's Hainan Island.

Border Guards of Hong Kong

Our Hong Kong stop included a visit to Aberdeen's junk fleet (pages 726 and 740), a look in on the 16,000 Chinese Nationalist refugees who exist at Renne's Mill Camp (page 741), and a trip north to the barbed-wire frontier between British territory and Communist China.

At the frontier we met Inspector Thomas MacKenzie, in charge of the British border area.

"That's China on the other side of the fence," he said. "The fence stretches for 12 miles, and we keep searchlights on it at night."

As we approached a small bridge guarded on our end by British soldiers and on the other by Communists, the inspector warned us not to do anything to upset the harmony of the situation (opposite page).

"We don't talk to them, and they don't talk to us. We have good silent cooperation," said he.

"If we don't want to admit a person from Red China," he continued, "we just stop him on our end of the bridge, and, after a few minutes, they come over and take him back. We do the same for them."

On the flight to Tokyo, our route was again bent to avoid an island. This time it was Formosa, stronghold of Nationalist China's forces. We paused for gasoline and Coca-Colas at Naha, Okinawa.

In the air again, Joe and I busied ourselves matching the Islands of the Nansei chain with their names on The Society's map of Japan and Adjacent Regions of Asia and the Pacific Ocean.

A fellow passenger was Paul Schwarz, a young Dutch trader. In the same southeastern Asia where spices lured his ancestors in their tiny sailing vessels, Paul was traveling by air and selling food flavors.

Tokyo—Rebuilt or Rebuilding

In Tokyo we saw very little to remind us that more than 55 square miles of the city were leveled by the bombing and ensuing fires of World War II.

With few exceptions, where it wasn't rebuilt, Tokyo was rebuilding. From my hotel window I looked out on the steel framework of a new office building.

At Tokyo Onsen (hot springs), four modern stories of hot baths, chess and mah-jongg parlors, a billiard room, a restaurant, and a cabaret, I found tired businessmen bathing and relaxing while their wet [illegible] pressed, laundered and polished.

In the well-equipped studios of the Broadcasting Corporation of Japan I saw a program schedule listing basic English, Fountain of Knowledge (like Information Please), American Folk Songs, Twenty Gates (like Twenty Questions), Early Bird, My Book Shelf, and Quick wit Classroom (like It Pays to Be Ignorant).

* See "Scintillating Siam," by W. Robert Moore, NATIONAL GEOGRAPHIC MAGAZINE, February, 1947.

† See "Turbulent Indochina," by W. Robert Moore, [illegible]

British and Red Chinese Practice "Silent Cooperation" at a Hong Kong Border Bridge

[illegible]

At the Imperial Theater I saw the musical [illegible] and costumes [illegible] were in the Broad [illegible]

[illegible] purely Japanese [illegible] tea and zeppo [illegible]

[illegible] centuries-old [illegible] and carp-filled pools, we removed our [illegible] and stooped low to enter the three-foot-high door of a ceremonial teahouse.

[illegible] on the floor with my stiff-jointed legs [illegible] tucked under me, I paid strict attention to my companions so that, when I was [illegible], I knew [illegible] what to do.

[illegible] the cup was set before me. I placed [illegible] knuckles down, on the floor and bowed. Picking up the handleless cup and placing it on the upturned fingers of my left hand, I turned it three clockwise quarter turns with my right.

[illegible] I sipped the fragrant [illegible] marked an excellent [illegible] the contents with [illegible] the final, cup-emptying draught.

Five Courses of Eels for Dinner

Bolstered with a pillow on [illegible] allow smooth [illegible] that night. The first [illegible] I enjoyed [illegible] lovers [illegible] soup, broiled [illegible] eel, and pickled [illegible]

During the meal by the [illegible] of my friends [illegible] and her [illegible] appeared [illegible]

[illegible] by [illegible] by [illegible] lasting [illegible] when [illegible] were not [illegible] back, but, like the ceremonial tea, resulted from age-old tradition and years of training.

The following night I went to bed on [illegible] of Pan American's big two-deck Boeing Stratocruisers and woke up next morning just

The World.

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SHE'S BROKEN EVERY RECORD!

A Little Pardonable Consternation Among the Globe-Circlers at the Remarkable Achievement of "The World's" Traveller.

Verne Followed Every Step of the Journey on His Globe.

FATHER TIME OUTDONE!

ALL LOOKS, IN PANTOMIME

Nellie Bly Circles the World in 72 Days, Compares Week Off Jules Verne's Fictional Record

[illegible] an ulster, and several chapters of [illegible] up the [illegible] Storm [illegible] in the Pacific, [illegible] (home) success [illegible] 12 [illegible] was spent [illegible] the World's [illegible] 116 came within [illegible] Fenimore [illegible] Wake Island [illegible] the World's [illegible]

in time to dress before we landed for fuel and breakfast on Wake Island.

During the day's flight we crossed the International Date Line and gained the day we had lost piecemeal during the preceding two months of eastward flying. We had left Tokyo on Thursday evening, July 11; we landed in Honolulu Thursday evening, July 12, some 24 hours later (page 742).

After two days at Waikiki Beach, which encompassed sun bathing, outrigger canoeing, and sailing a speedy, twin-hulled catamaran in a 20-knot wind off Diamond Head, Joe concluded, "Next time we go around the world, let's do it right here."

My first glimpse of the United States mainland was the peaks of California's mountains, rising like islands above a shimmering white sea of clouds.

After brief stops in San Francisco and Los Angeles, I flew east. In Chicago, two and half hours from home, and after [illegible] 7,000 miles of flying, I missed a plane connection for the first and only time.

My journey's end in New York was not marked by the counting of seconds that attended Phileas Fogg's return to the Reform Club in London. I had easily equaled his 80-day time. Nor were the cannon at the Battery and Fort Greene fired as for Nellie Bly, famous New York *World* reporter, when in 1890 she finished her earth-circling trip in eight days less than the fictional Fogg and I had taken.

But in Nellie's words: "I took off my cap and wanted to yell [illegible] not because I had gone around the world, but because I was home again."

Our Narrowing World

The Story of the New National Geographic Map

TO MEET the need for an up-to-date [illegible] National Geographic Society presents with this Issue of its Magazine the best map of the world it has yet produced. It reflects new geographic knowledge obtained by explorers, airborne cameras, and patient oceanographers since previous maps were made.

The map's 5,458 place names conform to latest official spellings. Scores of them are new: Israel, Jordan, Indonesia, and Pakistan, for example; Formosa for Taiwan, Djakarta for [illegible], Krung Thep for Bangkok, and Levant States are now Syria and Lebanon.

By looking at a clock and the World Map inset showing time zones, one can tell in a moment what time it is anywhere in the world.

After painstaking preparation of the master map by National Geographic cartographers, more than 2,100,000 copies in ten colors have whirled from a battery of big lithographic presses for distribution to members in 160 countries, to schools, libraries, and government agencies.*

World View Vital for Survival

On the World Map the United States looks small—less than six inches wide compared to 39 inches for the earth as a whole. Yet, measured by the time it takes to travel around it, the whole "wide world" today is less wide than was the North American Continent a short lifetime ago.

At the beginning of this century of ever-increasing speed, it took at least four and a half days to cross the United States from New York to San Francisco by the fastest possible means, the railroad train.

Now a United States Air Force B-50 bomber, refueled four times in the air, has circled the world nonstop in 3 days, 22 hours, and one minute. Any man or woman with the necessary fare, passports, and taste for haste can make the circuit by scheduled airliners in a week or less (page 765). Jets, rockets, and atomic power promise—or threaten—to shrink the world still more.

Ignorance of the geography of nations was perhaps excusable a generation ago, but today knowing and understanding the many diverse countries of the world has become urgent and vital for our national survival.

What happens in Moscow or Peiping today, or in Korea or divided Berlin, can affect the lives and fortunes of Americans more quickly than the firing on Fort Sumter in South Carolina did 90 years ago.

Formosa, Yugoslavia, Iran—datelines from such distant places turn up in a single day's grist of important news. Only a world map will show where they are in relation to the United States and its friends in far parts of the earth.

The National Geographic Society map gives the background of the global struggle between Soviet Communist expansionism and members of the United Nations carrying out their charter obligation to prevent aggression. For world travel in fancy or fact, or for international business planning, the map will be equally useful.

One-piece Panorama of the Earth

Beginning in 1905, The Society has issued nine world maps. On these, and on the many National Geographic maps of the continents, the geographer and historian can note the changes in boundaries, the changes in sovereignty, and the growth and disappearance of states during the past half century.

The world maps have been among the most popular ever issued. Like three of its predecessors, this one shows the earth in a panorama uninterrupted except by the borders of the map.

In 1943, when The Society first published a world map, it was divided along the meridian 80 degrees east of Greenwich to keep the Pacific theater of war intact. For at that time Japanese naval forces were active in the Bay of Bengal.

Today, with Japan removed as a threat and United Nations forces alert to maintain peace in the Pacific, Chief Cartographer James M. Darley divided this National Geographic map along the 90-degree meridian east of Greenwich to keep the Indian peninsula intact.

Ancient Greeks, Alexandrians and Romans centered their maps on the Mediterranean, around which, as Plato quoted Socrates, they lived "like ants or frogs about a marsh." Early Christian cartographers made Jerusalem the center of their maps. Today's World Map is centered on the Americas, source of so much of the leadership and aid, so many of the men, machines, and raw materials needed for the preservation of freedom in older lands.

Abreast of current history, this December, 1951, World Map carries an inset showing

* Members may obtain additional copies of the new World Map (and of all standard maps published by The Society) by writing to the National Geographic Society, Washington 6, D. C. Prices in United States and Possessions: 50¢ each on paper; $1 on linen, India, 35¢. Elsewhere, 75¢ on paper; $1.25 on linen, India, 50¢. All remittances payable in U. S. funds. Postpaid.

the 60 United Nations, the Atlantic Pact countries, and the territories in the Soviet orbit. On it one can trace the "Iron Curtain," Communism's 2,000-mile-long barrier against free information, travel—and escape.

The Iron Curtain, marking the western limit of Soviet occupation or control, runs through Europe from the Baltic to the Black Sea, splitting Germany and walling off Soviet satellites from contact with the western world. Although eastern Austria is Soviet-occupied, the country is administered as a whole by a united pro-Communist federal government. Little Albania, on the other hand, is a Russian satellite outside the curtain.

Russia, the Union of Soviet Socialist Republics, is the world's largest single country in area, though far surpassed in size and population by the British Commonwealth and in industrial and educational resources by the United States. The free association of states linked to the British Crown still numbers more than one fourth of all the people of the world, despite the postwar loss of Burma, now sailing its ship of state alone in strategic Asia. Both India and Pakistan, when granted independence, elected to remain as members of the British Commonwealth.

The following figures show the stature of the world's giants.

	Square Miles	Population
British Commonwealth	12,950,000	598,000,000
U. S. S. R.	8,599,000	193,000,000
French Union	4,613,000	110,000,000
Canada (incl. in Br. Commonwealth)	3,845,000	14,000,000
China	3,760,000	(Est.) 464,000,000
United States & Territories	3,622,000	152,000,000
Brazil	3,288,000	55,000,000
Australia (incl. in Br. Commonwealth)	3,158,000	9,500,000

The Soviet Union and its satellites—Albania, Bulgaria, China (excluding Formosa), Czechoslovakia, Germany (Soviet Zone), Hungary, Mongolian Republic, Poland, and Rumania—together total 741,600,000 people and 13,363,700 square miles.

Polar Regions Mapped Separately

Since the earth is not flat but a big ball, or spheroid, no flat map of the world can give an exactly true picture of its surface. The National Geographic map is planned to minimize the inevitable distortion and variation in scale.

For this map, as well as three previous world maps, The Society's cartographers chose a projection, or system of intersection of meridians and parallels, that gives perhaps the best over-all picture of the round earth on flat paper. Called the Van der Grinten Projection, it was invented nearly 45 years ago by the late Alphons Van der Grinten but was little used until National Geographic map makers saw its possibilities for their world map of 1922.*

This design shunts most of the distortion and scale change into the polar regions. Accordingly these areas have been omitted from the world panorama and mapped separately in twin insets which give accurate pole-centered pictures of the earth's top and bottom. The North Polar inset shows, for example, how short is the route between Russia and the United States by the Arctic back door.

The map records many changes in territorial and political alignment since The Society's last large World Map was issued eight years ago. Newfoundland has become the tenth Province of the Dominion of Canada. Iceland has severed all ties with the Kingdom of Denmark. Ireland has given up dominion status within the British Commonwealth. Ceylon has become a Dominion and the Republic of Israel a reality.

Poland Pushed Bodily Westward

Europe's greatest territorial changes involve Russia, Poland, and Germany. Today's Poland is a new state which has been pushed west some 50 miles, losing land in the east to Russia and taking from Germany in the west.

Other annexations include Germany's East Prussia by Russia and Poland, Rumania's Moldavia and Czechoslovakia's Carpathian Ukraine by Russia, and Soviet seizure of Latvia, Estonia, and Lithuania.

Some of these changes have not been internationally approved. The map merely shows the de facto situation.

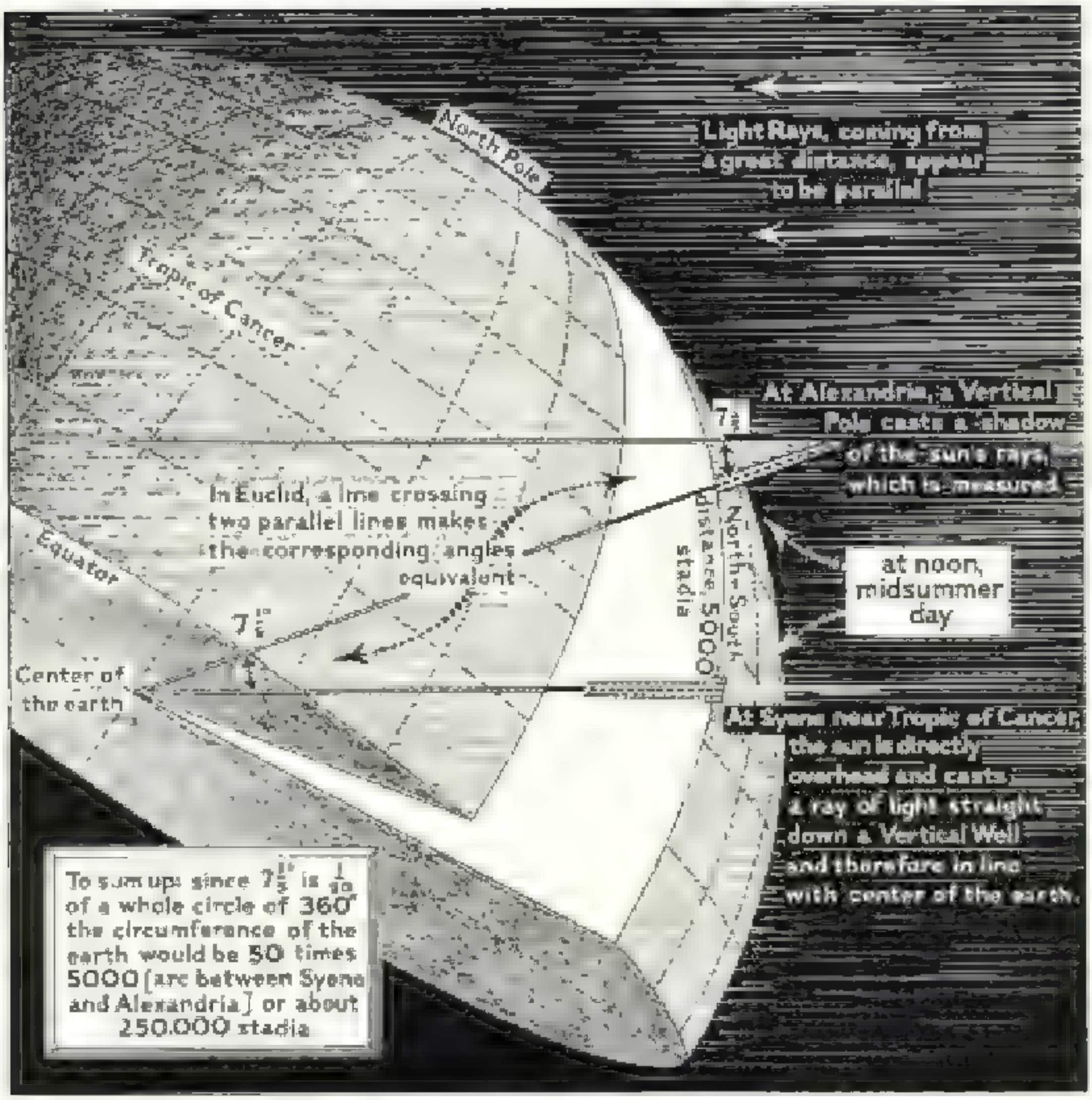
In Africa former Italian lands are going separate ways. Libya is on the road to independence. Eritrea is to be annexed to Ethiopia next year. Italy administers Somalia, the erstwhile Italian Somaliland, under a UN trusteeship designed to prepare the country for independence within 10 years.

In Asia, seething with hot and cold war, a hopeful note is the new Japan. Forty-eight free nations stood firmly together at San Francisco to give Japan a new start under a statesmanlike peace treaty.

Aerial camera explorations by the United States and Canadian Air Forces have greatly altered the mapped outlines of lands in the Arctic since the war. In fact, one new island in the Ellesmere Basin has been appropriately christened Air Force Island by Canada.

Although little larger than an opened news-

* Members can get a beautiful explanation of map projections used by cartographers in "The Round [illegible] Research Cartographer Welbourne Thompson with 67 illustrations from photographs and drawings by Charles E. Hallford by writing to the National Geographic Society, Washington 6, D. C. Price 75¢



Thus Eratosthenes Made the First Measurement of the Earth

[illegible]

[illegible] Eratosthenes [illegible] Alexandria [illegible] Syene [illegible] present [illegible] would be like [illegible] of a map of the United States [illegible] victory of [illegible]

At Syene [illegible] Eratosthenes [illegible] Alexandria [illegible] Sun [illegible] illuminated. The [illegible] down into the well.

A beam as bright as [illegible]

in the librarian philosopher's mathematical mind. At Alexandria he put up a pole, as perfectly erect as he could make it. Then at noon on June 21 he measured the angle of the pole's shadow. It was $7\frac{1}{2}$ degrees.

Knowing geometry, Eratosthenes was aware that if the pole and the well were extended to the center of the earth they would meet at the same angle, $7\frac{1}{2}$ degrees (diagram, page 753). Since there are 360 degrees in a circle, this $7\frac{1}{2}$-degree angle was $\frac{1}{50}$th of the whole circle. So the distance between Syene and Alexandria must be $\frac{1}{50}$th of the circumference of the earth.

Thus, to find out how far it was around the earth, all Eratosthenes had to do was to multiply the Syene-Alexandria distance by 50. This he did in the unit of measurement called the stadium, probably equal to about ten feet. Syene was 5,000 stadia away, so the distance around the earth must be 250,000 stadia.

Even a coldly mathematical heart must have leaped with the joy of pure discovery. Standing on one little corner of the vast, mysterious, unexplored earth, one man—by the power of mind—had thrown a tape measure around the globe.

Actually the measurement was not exact. If we substitute the new-known number of miles for Eratosthenes' 5,000 stadia, we get 520 miles times 50, or 26,000 miles. Today we know that the girth of the earth is 24,901.96 miles. But Eratosthenes' result is remarkably close when considered in the light of the crudity of his instruments and data.

Despite the much earlier work of Eratosthenes in the same city, Ptolemy of Alexandria, in the 2nd century after Christ, conceived of the world as much smaller than it is. Believing in a Ptolemaic-sized world, Columbus thought he had reached India when he had sailed no farther than the West Indies.

One Day Mysteriously Missing

In those days the world, instead of getting smaller, was growing larger as mariners discovered its extent. First to sail entirely around it was not Magellan—he was killed on the way—but members of his crew, including the highly articulate Antonio Pigafetta.

Nearing home with his gossipy round-the-world diary, Pigafetta was puzzled to find it was Wednesday, July 9, 1522, aboard, but ashore in the Cape Verde Islands it was Thursday, July 10.

"We could not persuade ourselves that we were mistaken," he wrote after the worn-ridden, storm-battered *Victoria* reached Spain just 12 days short of three years after the start. "I was more surprised than the others, since I had every day, without intermission, written down the day that was current.

"But we were afterwards advised that there was no error on our part, since as we had always sailed toward the west, following the course of the sun, and had returned to the same place, we must have gained 24 hours!"*

Sailing with the sun slows its apparent speed and thus lengthens each day. Pigafetta's calendar was a day behind because he failed to record these slight daily gains.

New Knowledge of "Rivers in Sea"

These pioneering circumnavigators would have made their voyage in less time had they possessed our modern knowledge of the world-wide, interlocking system of ocean currents, shown by brown arrows on this map.

Prevailing winds, rotation of the earth, topography of the ocean floor, discharge from large rivers, melting of icebergs, heating and cooling of large bodies of water, evaporation, rain and snow all play a part in maintaining the oceans' vast, ceaseless circulation system.

Surface currents range in speed from hardly perceptible drifts to five miles per hour in the Gulf Stream, swift enough so that in 1513 Ponce de León's ships could not stem it.

Within the past year oil tankers surveying the Gulf Stream for the United States Navy in this same area found that ships can save 3 to 10 hours' steaming time between Cape Hatteras and Key West by staying close to the eastern edge of the Gulf Stream southbound, and that the strongest currents on the northbound route are well inshore.

This American-born stream in the sea brings its warmth to Britain and Europe. It keeps Russia's Arctic port of Murmansk ice-free all year and makes far-north Spitsbergen a summer resort for Norwegians.

The Gulf Stream's course is not always constant. Often it meanders like a river, turning up far from its supposed location, but whether these shifts affect weather in Europe has not been definitely proved.

A two-way, "two-story" current through the Strait of Gibraltar completely changes the water in the Mediterranean Sea every 75 years. Salt tends to concentrate in the Mediterranean, since it loses more water by evaporation than it gains from rainfall and rivers. The heavy salt water sinks and flows out below the surface, while fresher water from the Atlantic moves in above.

All the great "rivers in the ocean" are mapped in the light of the latest knowledge on this new portrait of our world, 71 percent of which consists of the tidal, tossing salt water of Mother Sea.

* [illegible] in the Annals of the Sea," [illegible] National Geographic Magazine, December, 1932.

Uncle Sam's House of 1,000 Wonders

All Americans Benefit from the National Bureau of Standards, Where Science Has Served the Citizen for 50 Years

By Lyman J. Briggs * and F. Barrows Colton

LATE one night in Washington, D. C., a startled motorist suddenly saw a fire blazing up in a patch of woods just off busy Connecticut Avenue. Speeding to the nearest alarm box, he put in a hurry call for the engines.

When the firemen reached the scene, they found a group of men calmly watching the blaze from through the interior of a small brick structure, but making no effort to check the flames. Instead, they were reading instruments attached to wires that led inside the burning building.

"We're burning it on purpose to test some new 'fireproof' construction materials," they explained to the amazed fire fighters. "These wires lead to thermocouples that show how hot it is inside. We're from the National Bureau of Standards."

Dividends for the Taxpayer

Testing and setting standards for just about everything under the sun is the regular job of this great research center run by Uncle Sam, though usually it isn't done in quite so spectacular a way.

Few Federal Government agencies pay bigger dividends on the taxpayer's dollar than the National Bureau of Standards. Here science is constantly being put to work to make life easier, safer, simpler, and cheaper for the American public in a thousand different ways.†

Here one can get a preview of an amazing new world of tomorrow that is already being born in the Bureau's versatile laboratories.

In this new world we will not measure length and time with yardsticks and clocks, but with vibrations coming from inside atoms, having an accuracy undreamed of until now.

Much tedious routine office work will be done by almost-human computing machines that can add up figures in 50 one-millionths of a second. People may carry individual radios that fit in the vest pocket. And clothing moths will die of starvation because a new treatment for wool will give them indigestion!

Already the National Bureau of Standards has the know-how for all these things, and many more (pages 772-773).

Interests of the 1,600 NBS scientists cover the universe. They regularly listen for faint radio "broadcasts" from distant stars that interfere with earthly radio communication. They have weighed the earth, but also can measure how much a steel bar is bent when a fly alights on one end!

Almost everyone living in the United States today has benefited somehow from work done at the Bureau, an important part of the U. S. Department of Commerce. Look at a few examples:

Safer Airplanes and Elevators

Bureau men have made airplane travel safer by finding hidden causes of wrecks; found shades of red and green for traffic lights that won't deceive drivers who are partially color-blind; tested elevator door interlocks 5,000 times to make sure people can't open the door and fall down the shaft when the car is not there.

Their coldly scientific tests have forced off the market some really harmful automobile antifreeze compounds, dangerous "gas-saving" attachments for stoves, and children's inflammable Indian suits. They've tracked down criminals with scientific detective work, invented gadgets to help doctors save lives; and have saved millions of dollars for Uncle Sam by testing nearly everything he buys, from carpets for Congress to cement for the Panama Canal.

This year the Bureau is celebrating its first 50 years of service to the American public. In that time its scientists have played a major role in the vast changes that have taken place in everyday life since 1901.

What the Bureau Does

As one Bureau official puts it:

"The National Bureau of Standards provides, with improved techniques, the basis of precise measurement on which all progress in science and industry ultimately depends.

"This is by no means a cut-and-dried task. For example, with the expanded use of microwaves in radar a whole new field of electrical measurements had to be explored.

"With the increasing development of jet-propelled aircraft, we must have exact methods of measuring engine temperatures so that they can be operated at maximum efficiency."

The NBS has three main jobs. As its name

* Dr. Briggs is Director Emeritus of the National Bureau of Standards, a Trustee of the National Geographic Society, and chairman of its Research Committee.

† See "Washington—Storehouse of Knowledge," by Albert W. Atwood, NATIONAL GEOGRAPHIC MAGAZINE, March, 1942.

Measure of Standard Honors Dr. Briggs and Bureau of Standards' Two Previous Directors

[illegible]

[illegible] the National Bureau of Standards, [illegible] the world of [illegible] time—the length of an inch and the weight of a pound. Precise measurements have standard, ranging from [illegible] the [illegible] and radio waves. Now [illegible], to [illegible] or those where even tools will [illegible] standards [illegible] measurements of the electrical constants [illegible] and resistance and power, which provide the [illegible] upon which our great electrical industry is built.

Scientists [illegible] the quality and performance of [illegible] of products from temperature [illegible] to atomic [illegible] in the Federal Government, which is the world's largest [illegible] purchaser [illegible].

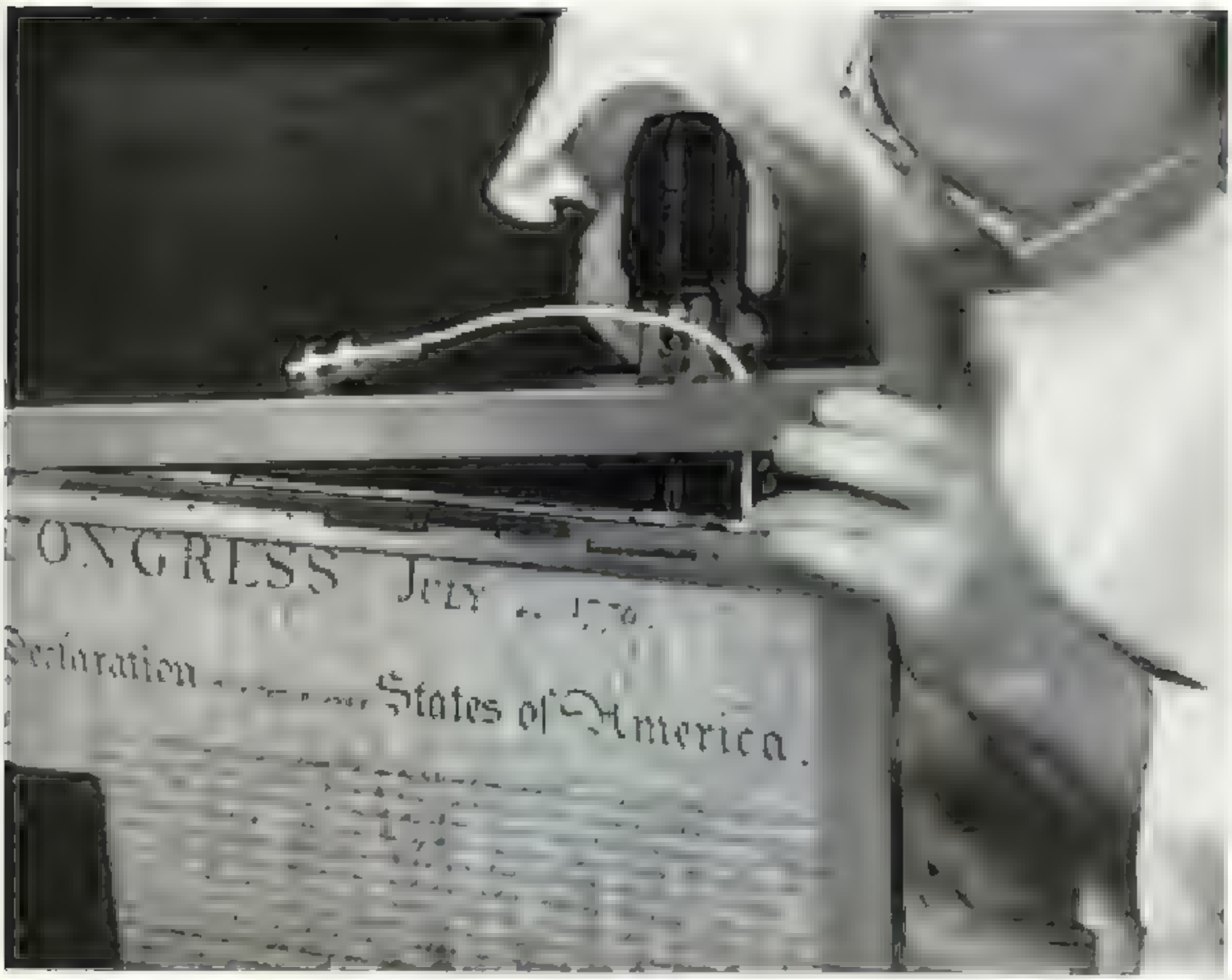
And [illegible] of research and development [illegible] have been increasing the [illegible] or accurate work [illegible] new [illegible] gas [illegible].

Special work for the Atomic Energy Commission will be [illegible] by the NBS at a new [illegible] Laboratory.

Today also is always when we [illegible] gather. The Bureau [illegible] are [illegible] develop new scientific measures [illegible] on their [illegible]. Now [illegible] sites for [illegible] of the Nation's [illegible] new NBS Laboratory at [illegible].

Congress established the National Bureau of Standards on [illegible] because scientists and businessmen were [illegible] for some central agency to the country to [illegible] of all kinds of things. [illegible] the Bureau [illegible] from scientific instruments [illegible] to [illegible] all the way to [illegible] for calibration [illegible].

[illegible] the Bureau [illegible] worth, [illegible] of [illegible] the [illegible] the [illegible] the NBS has helped to establish some of the industrial standards [illegible] by the American Standards Association, the American Society for Testing Materials, Consumers group [illegible] the NBS using [illegible] and reports.



America's Most Cherished Documents Are Preserved by Bureau Scientists' Skill

[illegible]

Working in the Bureau's laboratories are 62 research scientists who are paid by 13 different [illegible] and their assistants [illegible] work for the public benefit.

The article cannot begin to describe all the things the Bureau does, but a few examples will help show the amazing scope of its service to the citizen.

Weights and Measures Once Differed

In colonial days a foot was the length of a man's foot, before the shoe of Henry [illegible] [illegible] They varied from person to person.

Even as late as the 1820's a bushel of wheat in South Carolina contained [illegible] cubic inches more than a bushel in New York City. A pound in Massachusetts weighed less than a pound in Maryland. Because merchants in different cities used varying weights and measures, the Government lost large revenues from import duties.

But today, without precision standards of length, weight, time, temperature, electric power, radio wavelengths [illegible] [illegible] tion, our technical civilization would [illegible] in chaos.

American users [illegible] a billion dollars' worth of electric power annually. If [illegible] meters were [illegible], inaccurate by even one percent, either the power companies or their customers would lose $40 million a year. This does not happen, because meters are calibrated by comparison with the Bureau's master meter.

If a radio or television station's assigned frequency gets a little out of line, it interferes with other programs. All stations set their wavelengths by the Bureau's standards of frequency, which it broadcasts 24 hours a day on a world-wide scale.

These standard frequencies do not vary by more than two parts in 100 [illegible] They are controlled by crystal operated [illegible] at an always [illegible] temperature and pressure.

When a doctor takes a [illegible] to see if your health is [illegible] he counts the number of red and white cells in the blood

"Automatic Redeap" Lifts Luggage until the Handles Snap

[illegible]

[illegible] Though in the United States we [illegible] measure [illegible] in pounds, you will find the standard [illegible] in the National Bureau of Standards. Instead it [illegible] a standard meter and a standard *kilogram*, which are precisely calibrated against the international standard meter and kilogram [illegible]. Out [illegible] pounds, of a meter and a [illegible] 25.4 millimeters [illegible] of a kilogram.

The kilogram [illegible] or platinum-iridium [illegible] are provided [illegible] in locked vaults. The [illegible] to [illegible] human hands for a spot of perspiration could alter its weight.

When the kilogram is taken out [illegible] for two men, so that if one should faint or stumble the other would keep it from falling to the floor. When it is [illegible] for [illegible] other weights [illegible] the [illegible] works by [illegible] [illegible] just the [illegible] of his [illegible] [illegible]

Though [illegible] ever has [illegible] [illegible] weight [illegible] regulates [illegible] the value of an imported [illegible]. A [illegible] [illegible] a delicate balance is placed between two larger coils. When current is

[illegible] Albert W. Atwood
[illegible]

[illegible] pipettes is tested by the [illegible]

Bending Steel Bridge Girders

[illegible] thick strong [illegible] W. [illegible] steel bridge [illegible] for which it [illegible]

"Why Did My Shoes Wear Out Fast, Daddy?" He Cuts Them Open to Find the Reason

[illegible] for [illegible] and [illegible] in [illegible] and [illegible] in [illegible] to [illegible] in [illegible] and [illegible] in World War II the [illegible] developed a [illegible] capable of [illegible] and [illegible]

run through all three, the small coil is deflected slowly up or down.

Weights are then added to (or taken from) the scale pan to restore the beam exactly to its original position. From the change in weight and the [illegible] positions of the three coils, the strength of the current is measured in [illegible] amperes.

Length of a Second Is Crucial

Even the time [illegible] of a second of time can be crucial in today's world. Radio [illegible] in [illegible] from [illegible] flights and [illegible] depending on knowing the length of a second [illegible] ship — [illegible] depend on [illegible] knowing how fast a wave rises or [illegible] wave travels in one second [illegible] how long a second is.

To call the [illegible] superaccurate measures of time, NBS broadcasts [illegible] the National "standard second," a continuous [illegible] 24 hours a day. The interval between two ticks is one second, accurate to one part in a million.

Length of this standard second is based on the time of the earth's rotation, as determined by the Naval Observatory, which [illegible] hours.

But even the earth's rotation, the length of the second is changing. Friction of the tides in shallow seas is gradually slowing down the earth's rotation. Even the standard pendulum clock, under a single [illegible] slows down by [illegible] seconds, although measurements over a [illegible] period show no [illegible] change. Many hard [illegible] however, [illegible] with age.

Modern scientific [illegible] and [illegible] need even more precise standards, and [illegible] and time such as measuring [illegible] the speed of light [illegible] exploring the universe. In [illegible] years, NBS scientists have [illegible] a new standard [illegible] which [illegible] to the part in a billion, that is [illegible] which does not vary at all.

New "Atomic Yardstick"

The new atomic standard of length is the wavelength of green light emitted by atoms of a new kind of [illegible] mercury. Physicists [illegible] NBS. All light moves in waves, like waves in water, and wavelength is the distance between the crests of two waves. The wavelength of the green light of mercury 198 has been measured to one part

in a hundred million. One meter is equal to 1,831,249.21 wavelengths of this green light.

Mercury 198 was not available before the [illegible] mercury, but cannot be separated from it by any known method.

But now it is possible to make mercury 198 by reversing the dream of the alchemists of old, who tried to turn mercury into gold. Instead, modern alchemists turn gold into mercury 198 by bombarding the gold with neutrons in atomic piles or ovens, which were first developed for making atomic bombs. The Bureau now is making mercury 198 "yardsticks" for other scientific laboratories (page 702).

Vibrating atoms, instead of swinging pendulums, regulate the Bureau's new atomic clocks, which never run fast or slow. Molecules of ammonia control one clock. A nitrogen atom in this molecule vibrates 24 billion times a second, and this rate never changes. Another clock, even more accurate, is run by atoms of cesium, vibrating within themselves 9,200 million times a second, and this rate also does not vary.

Already plans are under way to have these atomic yardsticks and clocks adopted as the world's new standards of length and time. Bureau men also are considering atomic standards of weight, or mass.

The coming of the atomic age has vastly increased the use of radioactivity in all kinds of tasks, from treating disease to learning how farm crops use fertilizer. But, like dynamite, though useful, it is deadly dangerous if not carefully handled.

Taming Radioactivity

Bureau men have the crucial job of taming the insidious menace of radioactivity and standardizing its strength so that it can be harnessed for useful work.

Atoms of ordinary things like iron or phosphorus can be made radioactive, like radium, by bombarding them with neutrons in atomic piles. Scientists call them radioisotopes.

If properly handled, these isotopes can work scientific wonders inside the human body.

Just as ferrets can hunt down and kill rats in holes where men can't get at them, these isotopes can seek out and sometimes relieve internal ills otherwise beyond a doctor's reach.

For example, if you eat a little iodine, as you do in fish, it travels straight to your thyroid gland. If you have an overactive thyroid, operating on it may be undesirable for some reason.

Instead, the doctor may give you some radioactive iodine. When it gets to the thyroid, its rays in some cases may help the overactive condition. Radioactive phosphorus helps ameliorate some blood troubles because it travels to the body's blood-producing centers, the bone marrow, spleen, and lymph glands.

If little Johnny swallows a watch, its progress down inside him might be followed by listening for the ticking. Likewise, to find how iron is used in the body, a patient may be given some radioactive iron to swallow. The rays this iron gives out cause clicks in a Geiger counter. As the counter is moved over the body, its clicking shows where the iron has gone—to the brain, the biceps, or maybe the big toe!

With this "tracer" technique doctors are learning many things about how the body uses food and vitamins. Such information is useful in diagnosing and treating disease.

But these same rays that treat disease and show where tracer atoms go can be dangerous inside the body if they last too long or are too powerful. National Bureau of Standards tests are helping to show what doses are safe, yet strong enough to be useful.

Safe Handling of "Hot" Isotopes

Radioisotopes must be carefully handled outside the body as well. Unseen and unfelt, their rays can injure, cripple, or even kill.

To guard against this menace, the Bureau shows atomic scientists how to play safe. If the hands, cigarettes, lipstick, or food become contaminated with radioactive atoms, they can carry them into the mouth.

Radioactive materials can lurk in cracks in the floor or woodwork, on laboratory shelves or the tops of lamps where dust accumulates, or they may be spilled on workbenches or clothing.

Workers guard against all this by carefully cleaning their workrooms, wearing special clothing and even masks at times, and making frequent tests to find lurking traces of radioactivity.

Many of the Geiger counters and other instruments used by the Atomic Energy Commission, the armed services, civil defense personnel, and scientific laboratories are carefully calibrated in NBS laboratories so they will show correctly how much radiation exists where they are used.

Making X-rays safe to use and setting safety standards for X-ray equipment also are Bureau tasks.

Though X-rays as used on physicians' patients are normally harmless, some doctors and technicians have acquired severe burns or even leukemia from overexposure to the rays scattered in their workrooms.

When a dentist X-rays a tooth, he usually has the patient hold the film inside his own

Raw Optical Glass Made at the Bureau of Standards Celestial Image Division

[illegible]

Standard Screw Threads Make the World Run More Smoothly

Light of Man-made Mercury Is a Super-accurate Yardstick

Huge Metal Ears Catch Radio Signals Coming from the Sun

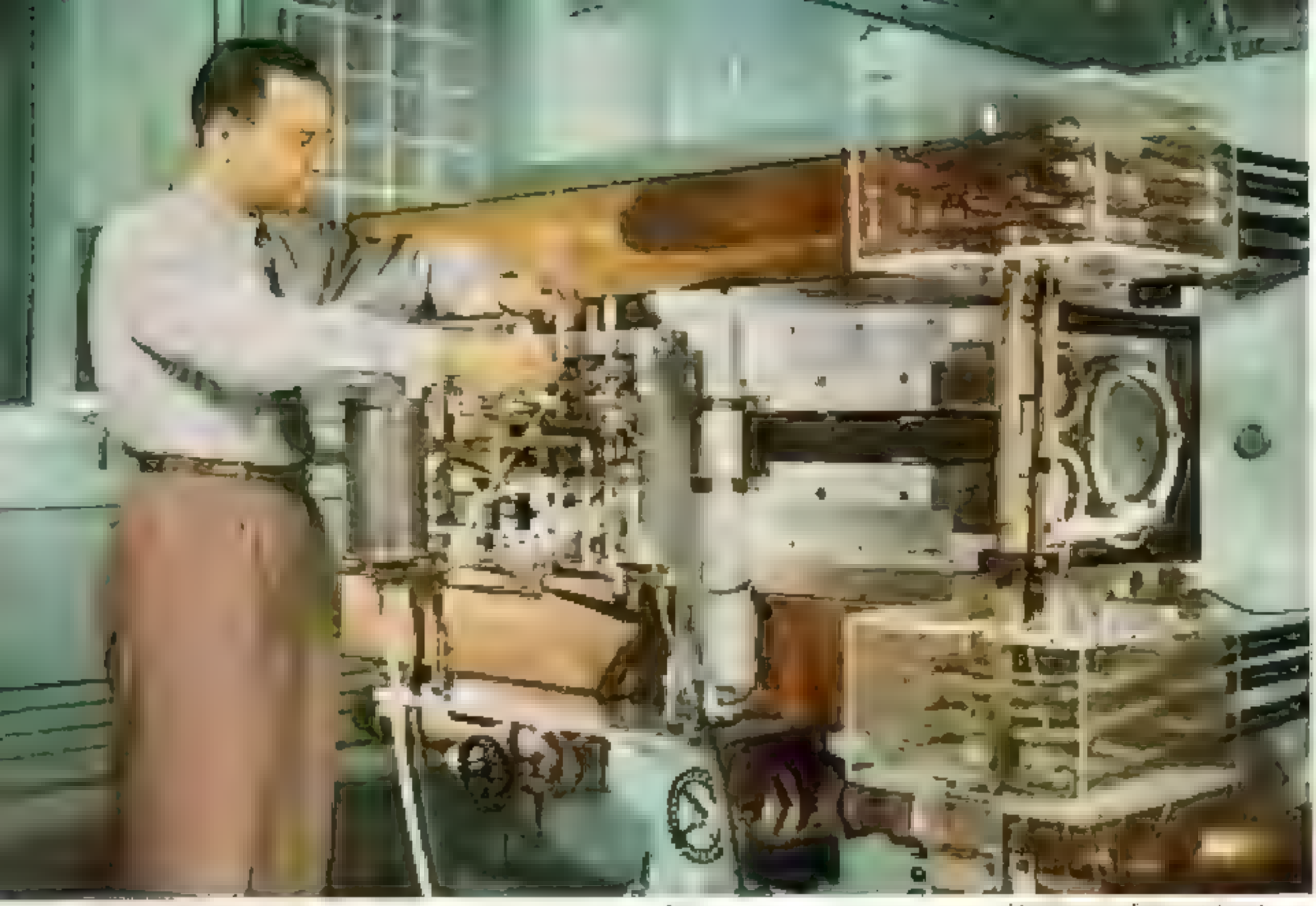
[illegible]

How Long Will a House Wall Resist Fire? Flames Solve the Problem

[illegible]

A Huge Hollow Sphere Tests the Brilliance of Ordinary Electric Lights

[illegible]

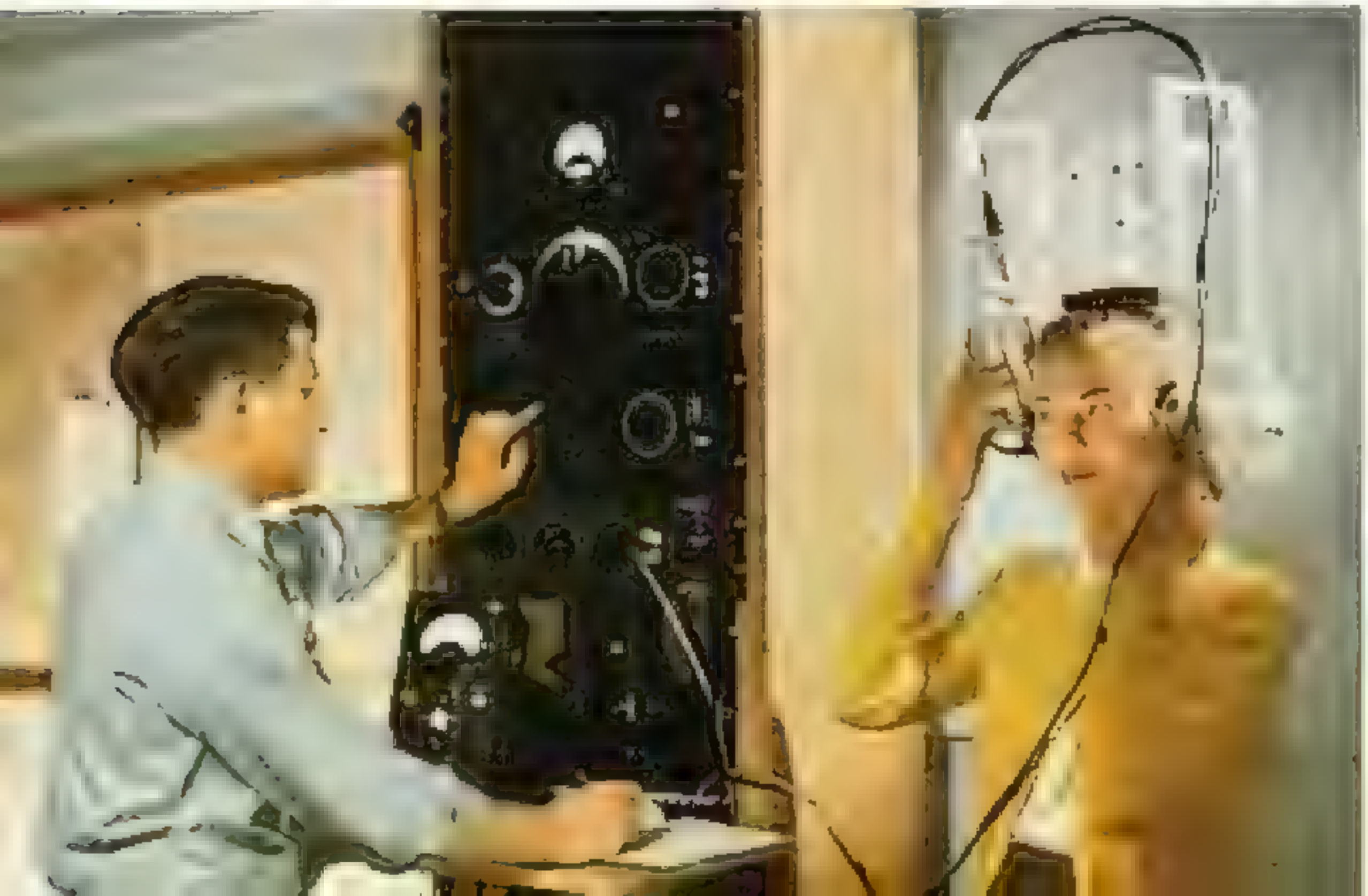


Invisible Electrons Are "Weighed" to Measure Units of Electricity

[illegible]

Plastic Headgear Tests the Efficiency of Earphones

[illegible]



Strips of Metallic Paint Protect Plane and Aircraft from Lightning Damage

[illegible]

A 150-ton Load Deflects Steel Proving Rings Using S 300 of an Inch

[illegible] tested to check the force exerted by [illegible] One machine at [illegible]

mouth. This brief exposure does no harm, but some dentists who have held the film themselves in the mouths of hundreds of patients for many years have lost the use of their fingers from gradual X-ray damage.

To prevent such accidents, the Bureau makes tests to see how much X-ray dosage is safe and how much lead or concrete is needed around X-ray machines to prevent the escape of the powerful rays.

X-ray beams of tremendous power, such as those used for treating deep-seated cancers within the body and for finding hidden flaws in metal castings, are being produced by two huge instruments in the Bureau's high-voltage laboratory: a 1½ million volt X-ray machine and a [illegible] million-volt betatron.

X-rays coming from such machines, except in the narrow, controlled beams used in treatment, are highly dangerous. Using huge slabs and blocks of concrete, NBS physicists build experimental walls to find how great a thickness is needed to stop the rays.

Walls to Protect Atom Bomb Workers

Workers in atomic bomb plants are protected by lead and concrete walls of the type tested for safety by the Bureau, and the same data will be used where atomic energy is harnessed for running power plants, ships, and planes.

Years ago, some women painting radium paint on luminous watch dials wet their brushes with their lips. Unknowingly, several doomed themselves to slow death by radium poisoning.

Today, that cannot happen, because the National Bureau of Standards checks people doing such work to see if too much radium is getting into their bodies. From time to time the workers blow air from their lungs into small balloons, from which it is transferred to evacuated flasks and sent to the Bureau for analysis (page 780). Air in workrooms is also sampled.

Radium gives off radioactive radon gas. If there is any radon in the samples of breath or room air, it sets off clicks on an automatic counter that measures how much is present. If too much radon gas is inhaled, or too much radium is deposited in the body, there may be a fatal breakdown of the red blood cells. If the Bureau test shows a worker is getting too large a dose, he is given leave with pay or even transferred to other work.

Tucked away in two small buildings, one on the Bureau grounds in Washington, D. C., and the other at a branch laboratory in California, are two strange-looking machines that may eventually revolutionize civilization.

These machines can solve in half an hour mathematical problems which would take a man two months to do with a desk calculator. They can add or subtract 11-digit numbers (such as 87,956,953,719) 1,100 times per second, and multiply or divide them 336 times per second.

This includes time taken by the machine to search its "memory" for the numbers fed into it, do the calculation, and give out the result. It can do addition or subtraction alone in only 50 one-millionths of a second and multiplication or division in only a little longer time, 250 one-millionths.

"Solving the Unsolvable"

This means that scientists and engineers can now solve mathematical problems previously unsolvable, because it would have taken scores or hundreds of people working months or even years to get the answers by other means.

Electrical impulses, dashing through a maze of electron tubes and wires, do the calculating work. Problems are fed in by cable, in the form of holes punched in paper tape or as pulses on magnetic tape. Answers click out on a teletype machine, as if typed by an invisible hand.

"Though these machines are fast and accurate, seemingly almost human, the operator has to do the thinking for them," a Bureau mathematician explained. "They are like a group of reliable but simple-minded clerks, working under an expert boss. The boss breaks down a complicated problem into simple operations the clerks can perform by following a pattern that he sets.

"We know the machines give correct answers because we check them from time to time by feeding in problems whose answers we already know."

Already the Washington machine is working out, in periods of a few days, problems of long-range planning, supply, and budgeting for the U. S. Air Force that formerly would have taken months to solve. It was financed by the Air Force partly for this very purpose.

"Just as our ships are now propelled by steam turbines instead of galley slaves," says an expert, "I can see a time in the not too distant future when much office work in banks, government offices, insurance companies, and the like will be done by machines like these, instead of by clerks tied to routine office jobs."

In the fighting and winning of World War II, the brains and know-how of Bureau of Standards scientists were helpful to Uncle Sam in countless ways.

When word reached President Roosevelt that Germany had split the atom, he instructed the senior author of this article, then Director of the Bureau, to organize re-

search along the same lines. Dr. L. C. Green, who was appointed Director in 1945, and resigned at the end of September, 1951, did important research on atomic fission. Bureau chemists produced the first pure uranium and graphite, essential for making atomic bombs, and helped lay the foundations of atomic power work later put on a production basis by the Army's Manhattan District.

Proximity Fuse Helped Win War

Development of the famous proximity fuse, a tiny radio "brain" which vastly increases the deadliness of bombs, rockets, and artillery shells, and helped win crucial actions in World War II, was shared by NBS and Johns Hopkins University scientists.

The fuse is really a tiny radio set that sends out waves ahead of the bomb or shell. Bouncing back from the target, the waves set off the explosion as the missile comes near.

Equipped with this fuse, antiaircraft shells or rockets need not actually hit hostile bombers to destroy them. The fuse explodes the projectiles when they come anywhere within destructive range of the planes. Bombs and shells exploding at ground level do little harm to troops in near-by foxholes; but, equipped with the proximity fuse, they can be set to explode in the air just before they hit, showering deadly fragments downward, so that foxholes are of little protection.

Bombs and rockets equipped with the fuse enabled Allied bombers to knock out hostile antiaircraft gun crews so that bombing missions were more effective. British gun crews used the fuse to knock down Hitler's buzz bombs before they hit London. Army bombers used proximity fuses with deadly execution against the Japanese in foxholes on Iwo Jima.

Bombs or shells equipped with the fuse must not be "armed" (*i.e.*, safety catch released) until they are well on their way. NBS men devised the method of arming missiles that do not rotate in flight, such as bombs, rockets, and mortar shells. Johns Hopkins researchers developed another type for shells fired from ground or antiaircraft artillery, which do rotate.

Proximity fuses have brought nearer the day when we all may carry our own individual radios, small enough to fit in the pocket or handbag.

Pocket Radios on the Way

[illegible] no bigger than a man's fist. In that small space there is no room for the large tubes and copper wiring circuits used in ordinary radios. Bureau men developed tubes scarcely bigger than a pencil eraser and circuits made of lines of silver ink, printed on pieces of plastic, ceramic, or other insulating materials, just as the letters are printed on this page. These metallic ink lines conduct electricity the same [illegible] less space.

Individual pocket radios will use such miniature tubes and "printed circuits." Most modern hearing aids, much smaller than the older types, already use them. Valuable weight and space are saved in airplanes by using these new small parts in radio and airborne radar sets.

In the future, when trouble develops, repairmen will not need to spend valuable time tediously searching through a maze of wires. They will simply pull out the entire circuit, throw it away, and insert a new one costing but a few cents.

Back in the depression days of the early thirties, some Bureau scientists were discharged under the Government's economy program. One of them was in the midst of studying how various kinds of rubber refract, or [illegible] light waves. He found an outside [illegible] so that he could eat, and worked on at the Bureau without pay for three months to finish his project. When this country desperately needed a method of controlling the proportions of various ingredients in synthetic rubbers in World War II, this man's unselfish work of 10 years before proved to be the answer.

Production of planes was impeded at times in World War II because much of our bauxite clay for making aluminum had to be brought from abroad over submarine-infested seas.

That cannot happen again because Bureau men have found how to make aluminum from our own domestic clays. Though too expensive for peacetime use, the process is an "invaluable ace in the hole" if needed.

Standardizing Screw Threads

Operations in World War II were often dangerously delayed because America and Great Britain used slightly different kinds of threads on bolts and screws. For years American screw threads had been cut at an angle of 60 degrees, British threads at 55. American nuts would not fit British bolts.

Britain had to scrap the nuts on 100,000 oxygen cylinders made in America and manufacture new ones because the American type would not fit British plane attachments. British warship repairs were delayed in American yards because our screw threads were different from theirs.

Now America, Great Britain, and Canada aided by the National Bureau of Standards have agreed to standardize the threads on their nuts and bolts, largely adopting the American style. This will have vast peace-

[illegible]

Electric Bulbs, Burning until They Fail, Measure Their Life Span Accurately

[illegible] Government [illegible] in the Bureau [illegible] [illegible] to the public, [illegible]

like [illegible] or almost everything made [illegible] from [illegible] watches to locomotives is [illegible] with nuts, bolts, and screws. [illegible] will be far easier for mechanics in one country to [illegible] parts and make repairs for a machine manufactured in another [illegible].

Forecasting "Radio Weather"

NBS [illegible] keep a constant and wary eye on the [illegible] that happen [illegible] with life on earth, especially with radio.

Ultraviolet light [illegible] from the sun electrifies, or ionizes, layers of air 50 to [illegible] miles aloft, [illegible] the ionosphere. [illegible] around the [illegible] between the ground and these layers, making [illegible] communication possible.

[illegible] the [illegible] is [illegible] Radio message sent on a certain wavelength [illegible] between earth and sky to reach [illegible] in the morning, then [illegible] right through the [illegible]. On another wavelength that may not happen, and [illegible] station may [illegible] get [illegible]

[illegible] when [illegible] on the sun [illegible]

[illegible] part of the [illegible] radio [illegible] three months ahead what the [illegible] wavelength [illegible] through [illegible] They [illegible] a few weeks [illegible] changes in radio weather.

Airlines, steamship lines, [illegible] companies, [illegible] broadcasters all use these [illegible]

Sunspots cooperated [illegible]

---

* See "New Frontier in the Sky," [illegible] National Geographic Magazine, [illegible]

in World War II. Because there were only relatively few sunspots during the war years, long-range radio messages could be sent to our distant fighting fronts without too much interference.

Forecasts of radio weather were used in planning bombing raids for times when there would be no interference with radio signals guiding aircraft home, and in timing their returns to the [illegible] of the Pacific when their radio aids to navigation [illegible] was needed.

Tooth Fillings Last Longer

Next time you have a tooth filled with amalgam, you'll notice that the dentist probably kneads the filling material in a soft rubber container, not touching it with his fingers. There is reason for this.

Formerly, many people who had teeth filled suffered severe pain in them a few days later. Bureau scientists found the reason. Dentists often had mixed the amalgam by rolling it in the palms of their hands, not realizing that a little moisture thus got into the filling. Inside the tooth, the moisture released hydrogen gas, which expanded and caused pain.

Another thing to be noticed: formerly little was known about the filling material and how to insert it properly. Today 90 percent of dental amalgams meet standards of quality set by the Bureau, and fillings last much longer.

Bureau tests have helped develop new materials, both for false teeth and for denture bases, that won't shrink, break, or dissolve in mouth fluids, as many once did.

Experimental alloys and dentures are tried out on Bureau employees who act as [illegible]. Dentists and [illegible] get better materials tested by the Bureau and approved by the American Dental Association. Much of the work is done by research associates from the Association and the armed services who work in NBS laboratories (page [illegible]).

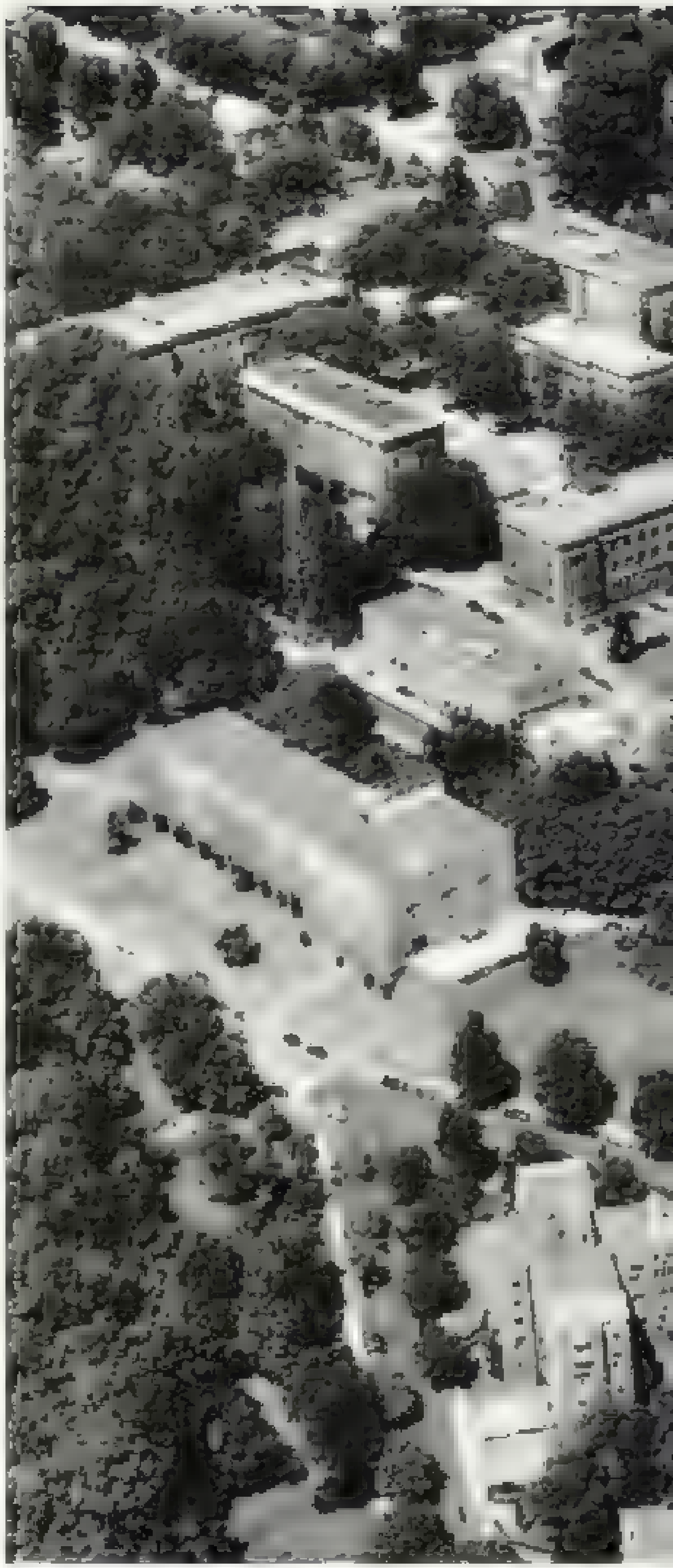
Bones Are Elastic

Breaking human bones to see how much punishment they can take is an NBS Navy project. This knowledge helps in designing airplanes and safety devices for them, so that flyers and passengers will have a better chance of surviving crashes.

Modern jet fighter planes are so fast that a [illegible] cannot bail out against the force of the air stream. Instead, the flyer is blasted [illegible] by a charge under the seat. The [illegible] Engineers want to know how much of a shock [illegible] can stand before they break, [illegible] transmit to vital organs.

Long bones of the human body, those of the arms and legs, average twice as strong as a pine [illegible]. Bones are elastic [illegible] and will bend and [illegible] without breaking [illegible] more brittle with age.

Once in Washington, a [illegible]. The [illegible] of the [illegible] that killed her had been traced down to [illegible] the hammer of the gun. One suspect had



Where Science Works for the Citizen

National Bureau of Standards Laboratories Have Made Life Better in Countless Ways

[illegible] chair.

[illegible] handwriting of Bruno Richard Hauptmann

If Properly Repaired, Watches Should Keep Good Time in Five Positions

[illegible] the Bureau [illegible]

[illegible] Lindbergh [illegible]

A forger was tracked down when his handwriting revealed that he had learned to write [illegible] by going to school [illegible]

Why Male Audiences Hear Better

[illegible] the incredible noise made by [illegible] Bureau [illegible] When [illegible] of Maryland's new armory, [illegible]

[illegible] more [illegible] than women [illegible]

When [illegible] Supreme Court [illegible] comments by the judges [illegible] suggested [illegible] through the court [illegible] at the same time [illegible] complimentary to attorneys [illegible]

A pamphlet, *Selection of Hearing Aids*, written by a Bureau expert [illegible] over the world. It is [illegible] from the Government Printing Office [illegible]

How strong [illegible] be? Steel, [illegible] the Bureau's [illegible] damage [illegible]

The Bureau [illegible] that dropped from [illegible] by the [illegible]

A good [illegible] starting at [illegible] should be [illegible]

Hot Coffee and Ice Cream Test a Tooth Filling's Reaction to Heat and Cold

[illegible]

[illegible] 50 times on the same spot, [illegible]

Next hope [illegible] plumbers to witness a [illegible] test [illegible] As it unreeled, the audience saw water [illegible] Then water stood [illegible] for the first time what actually happens inside the plumbing system of a house.

Most plumbers thought they knew, but [illegible] more than 1,500 [illegible] [illegible] complete plumbing [illegible] through it, and [illegible] themselves.

[illegible] showed that many pipes were unnecessarily large and systems often had more traps than were needed, adding to the cost. Demonstrations such as [illegible] actually educating these builders, saving money for the home builder.

Brick manufacturers didn't like it at first when the Bureau revealed that an 8-inch wall was just as safe for the average house as the 12-inch [illegible] But they soon found this [illegible] more people to afford [illegible] homes, increasing [illegible] of bricks.

[illegible] *Magnet* [illegible] *Flower* [illegible] and [illegible] Bureau [illegible] [illegible] Government Printing Office [illegible]

Rebuilding the White House

[illegible] showed [illegible] were growing while borings into the sand [illegible] to discover [illegible] from the [illegible] the War of 1812 or from the passage of time.

Years ago confusion [illegible] railroads in the [illegible] A [illegible] that weighed [illegible] another.

Today, in [illegible] with the Association of American Railroads and National Bureau of Standards test [illegible] with [illegible]

and weights, are constantly on tour, checking the accuracy of 19 master track scales. These scales don't vary now by more than three or four pounds in 80,000. Against these scales in turn are checked the 6,500 commercial track scales operated by railroads to fix freight charges and by manufacturers to check on production and transport costs.

Paper Money Made Tougher

Today you seldom see a torn dollar bill because Bureau paper experts have learned to make currency paper many times as strong as it once was. Sample bills must survive being folded and unfolded thousands of times in a testing machine. Even so, a dollar bill's average life is only eight months!

Asked to make Army map paper tough enough for hard field usage, Bureau men produced some samples bonded with a synthetic resin. To test them, soldiers cleaned rifles with the maps, used them for towels, and drove over them with jeeps on muddy roads. Washed off, the maps were as good as before.

With the dwindling of the Nation's supply of soft pulpwood used in making paper, the Bureau used the same resin to strengthen the shorter fibers of hardwood so that they could be mixed with softwoods. Many American paper mills use this process today.

Paper used in the NATIONAL GEOGRAPHIC MAGAZINE and maps and in the wrappers for mailing, was selected as the strongest and most durable obtainable for GEOGRAPHIC requirements on the basis of Bureau tests.

Once, when a building burned, valuable Government records were reduced to a pile of charred sheets. Bureau experts carefully placed them on photographic negatives and exposed them for several weeks. Gradually the all-but-obliterated writing was thus photographed in legible form and salvaged.

Airplanes hardly could operate today without the pioneering work of Bureau men. They could not follow radio beacons or get weather reports and landing instructions radioed from the ground without an NBS development that cuts out interference by shielding the engine ignition system.

Blind flying, instrument landing systems for use when airports are "socked in," radio range beacons and direction finders all were pioneered largely by Bureau engineers. They invented the radiosonde device that is carried aloft by small balloons, radioing back to earth automatically the temperature, pressure, and wind direction in the upper air, for use in weather forecasts. They developed automatic weather stations which, unattended, report weather by radio from remote locations.

How air flows over airplane wings at speeds approaching that of sound, a guide to making them the right shape, was first discovered in tests in Bureau wind tunnels. In one of the tunnels Dr. Alexander Graham Bell, the world-acclaimed inventor, tried out a model of his hydro frame, a motorboat driven by two airplane propellers, which in 1920 traveled 70.86 miles per hour. At high speed its hull rose clear of the water, and it ran only on small steel vanes set beneath, which offered slight resistance.

Tumbling over each other in a turning barrel, experimental dishes in the Bureau's ceramics laboratory get the equivalent of five years' washing and handling in 48 hours. In the barrel they are sprayed at intervals with hot water, soapsuds, and food mixtures. These tests, made in cooperation with the Vitrified China Association, have shown chinaware makers ways to make dishes less breakable, such as putting a slight bulge on a plate's bottom.

Two mysterious cases of lead poisoning once were traced by Bureau men to teacups decorated with colored glazes containing lead. Tannic acid in the tea which the victims had been drinking had dissolved some of the lead. Lemon juice, and vinegar used in salads, also could dissolve lead from such glazes, the Bureau's chemists found. Today these glazes are no longer used, and in glassware the colors are put only on the bottoms of plates and outsides of cups.

If one of your enamel-lined pots boils dry on the stove, don't pour in cold water while it's still hot. This causes the enamel to contract so rapidly, the Bureau found, that it may crack and absorb water. When the pot is heated again, this water turns to steam, resulting in further cracking and flaking.

Are Baseballs Livelier?

[illegible] entities come under the Bureau's [illegible] eye. When big league baseball teams start hitting more home runs than they did the year before, sports writers and others sometimes suggest it's because the balls are livelier. The Bureau settles these arguments with its baseball batting machine, which hits every ball with exactly the same force. Every test so far has shown that the balls aren't livelier. The batsmen are just better!

One problem the Bureau has never solved and probably never will is perpetual motion. Yet every year so many Americans think they have found the secret that the Bureau has a tactfully worded form letter explaining why their ideas won't work.

When one inventor received this letter, he wrote direct to the White House:

"Dear Mr. President: I want you to fire that dam fool at the Bureau of Standards who says perpetual motion is impossible"!

Photographing the Shape of Jet Flame Helps Design Better Engines

[illegible]

"Mind" Becomes Solid and Stands Under the Touch of Magnetism

[illegible]

Flowers Bloom In Patterns of Standards' 28-acre "Campus"

[illegible]

Testing the Breath for Radioactive Gas Safeguards Health of Radium Workers

[illegible]

How Salt Sea Water Flows under Fresh Is Tested with Dye in a River Model

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

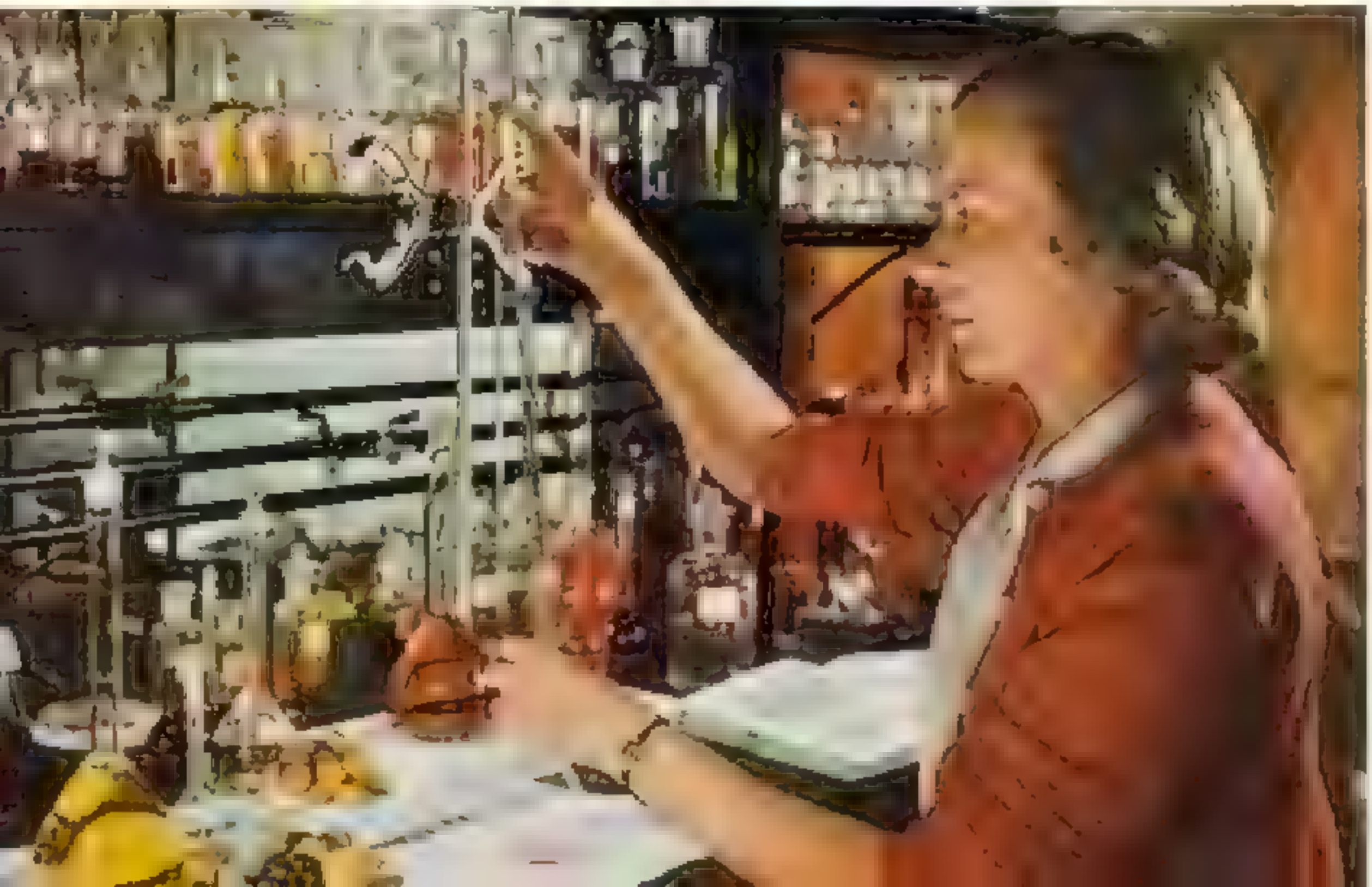
[illegible]

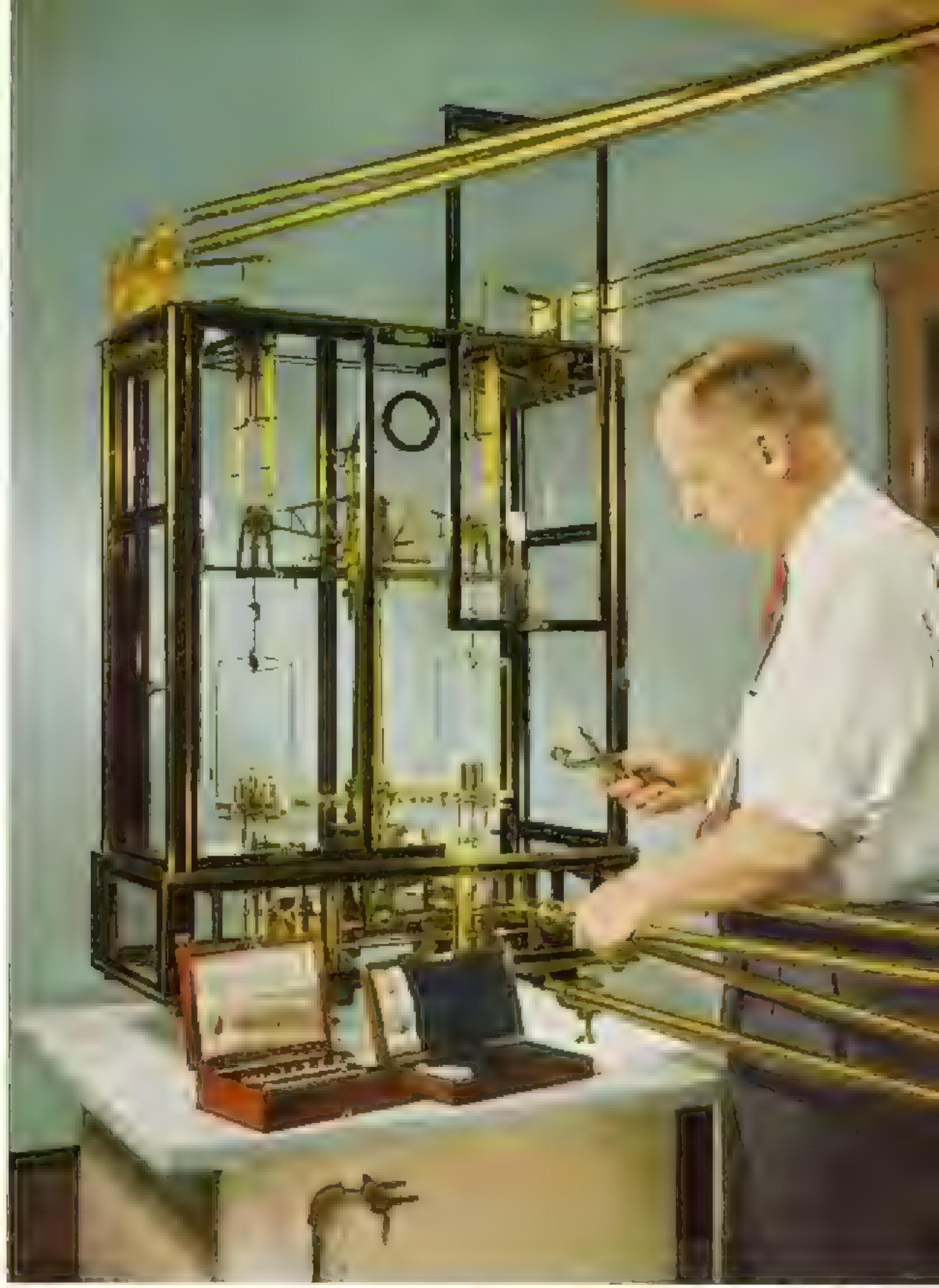
Strange Things Happen to Helium Chilled to 456° F. below Zero

[illegible]

"Detective" Dye Reveals Impurities in Oils, Drugs, Cleaning Fluids

[illegible]





Human Hands Never Touch the Nation's Standard Kilogram on Scale Pan Bisher

Talking Books Enable the Blind to Hear Best Sellers Read Aloud by Phonograph

[illegible]

Mexico's Booming Capital

By Mason Sutherland

With Illustrations by National Geographic Photographer Justin Locke

"Look out [illegible] American resident of Mexico City told me. "Did you ever see so many high buildings going up all at once?"

What he showed me was a jungle of skyscrapers, built and building, on every side.

Some of these structures were so daring they made their older counterparts north of the border seem pallid and conservative. Architects, cutting loose from Spanish colonial traditions, had applied stainless steel, plate glass, and color with the lavish hands of today's automobile designers.

Indians Work amid Steel

Sundecks, terraces, and penthouses replaced the slender outer walls of old palaces. New office buildings were sheets of glass thinly ribbed with stone, entire corners were multistoried solariums. Junior-size skyscrapers [illegible] turned concave faces to the streets, others were convex (pages 794 and 799).

Later, as I walked the streets and peered into the pits of skyscraper excavations, I saw Indians doing the work of steam shovels. Scarcely more than five feet tall, the toilers carried bucksheets of earth hung from tumplines attached to foreheads. At noon they ordered no food from cafés, but cooked their own village-grown beans over an open fire. In the midst of steel, they looked as primitive as Stone Age men.

I discovered the face of old Mexico City in house walls flush against sidewalks and in tree-shaded, flower-spangled patios concealed behind those walls. Strolling the streets, I encountered men sweeping walks with besoms, old-fashioned bundles of twigs. Bicycle delivery boys juggled huge breadbaskets on their heads. Sandaled Indians in white cotton pants competed for sidewalk space with handsome descendants of conquistadores.

Strangers Feel the Altitude

Mexico's capital lies just south of the 20th parallel, which, as it stretches across the world, intersects over-dry Saudi Arabia and [illegible] Mexico City enjoys a year-long spring, or autumn, broken only by the rainy season (summer). Businessmen as well as college boys take advantage of the mild climate to go hatless. Seersucker suits are as rare as coonskin coats.

At 7,350 feet above the sea, the city sits in the Valley of Mexico, a maguey-studded basin enclosed by mountainous ramparts such as snow-clad Popocatepetl (Smoking Mountain, page 815) and Iztaccihuatl (White or Sleeping Woman), two old, familiar volcanoes.

To compensate for altitude's low oxygen volume, Nature gives Mexico City man more red blood cells. When sea-level man comes up to these heights, his blood system calls out the spleen's red cell reserve, and the bone marrow manufactures more. The average individual takes a week or more to adjust. Alcohol and coffee play strange tricks on visitors unaccustomed to the altitude.

For centuries beyond memory the Valley of Mexico was the focal point of migrating Indian tribes. Brilliant civilizations scattered their temples and pyramids across the vale and, declining, vanished in a the limbo of forgotten peoples (pages 816 and 824).

About 1325 the Aztecs wandered here in search of a promised land. Tribal legend says that, fulfilling a prophecy, they spotted the omen they had been seeking, an eagle perched on a nopal cactus with a serpent in its talons; these symbols appear on Mexico's seal and flag to this day.* Where the cactus grew, the Aztecs founded Tenochtitlan, which means "Place of the Cactus Pear."

Cortes Found a New-World Venice

When Hernán Cortes and his band of fewer than 400 followers arrived in 1519 to visit Montezuma, the Aztec Emperor, the Spaniard likened the town to Sevilla.

Venice would have been a better comparison. Tenochtitlán stood on an island in old Lake Texcoco, thousands of canoes thronging its waterways. Its farm produce came from *chinampas*, or floating gardens, won from the lake bed (page 810).

Tenochtitlán has been dead four centuries. Spaniards, conquering the city in 1521, demolished its pagan temples and erected Mexico City on its grave.

Texcoco has been drained; the lake's Indian-built causeways are now broad avenues. But Montezuma's dead hand still marks the city.† The National Palace (page 791) and Chapultepec Castle occupy sites of his royal residences on the Zócalo, the main plaza, and in Chapultepec Park (page 789).

* See "Diary of the Americas," by Elizabeth W. [illegible] National Geographic Society, May, 1949.

† See "North America's Oldest Metropolis," by Frederick Simpich, National Geographic Magazine, July, 1940.

A Concrete Honeycomb Takes Care of the Streets

[illegible]

[illegible] represented by a long main avenue bearing three names.

Mexico's Magnificent Main Street

[illegible] Lorenzo L. Madero [illegible] at the [illegible] Street. [illegible] Imperial way between the National Palace and his home in Chapultepec Park.

[illegible]

Vanished Lake Causes Trouble

[illegible] Overhead sections [illegible] Lake [illegible]

[illegible] workers driving

Automobiles, Taxis, and Buses Funnel into Avenida Juárez as if Drawn by a Magnet

[illegible]

[illegible] joining Sagrario [illegible]

Mexican Engineers Solve Sinking Problem

[illegible]

huge concrete [illegible] to build [illegible] a wonderful pool. [illegible] upon the underground [illegible] closet.

In the [illegible] I watched a drawing of the National Lottery. [illegible] plans, but we are [illegible] the building [illegible]

Rearing Industries Fringe City

[illegible]

tal works. Company names, many half American, half Mexican, reflect their capital structure.

Mexico welcomes new foreign enterprises, some with five- and ten-year tax exemptions, but in most cases limits investments to 49 percent and insists that majority stock be Mexican-owned.

"Someday," I was told, "Mexico will be as industrialized as the United States—in proportion to its size, of course."

My informant was Edmundo J. Flehan, president of the Confederation of Industrial Chambers of Mexico and vice president of Goodrich-Euzkadi, B. F. Goodrich's Mexican associate.

Factories Can't Keep Up with Demand

Senor Flehan, son of an American father and a Mexican mother, started work in San Francisco more than 30 years ago, but moved to Mexico City.

"In those days," he said, "young Mexicans devoted their energies to war and revolution; they talked about señoritas, horses, and bullfighting. Nowadays their sons discuss opportunities in industry and commerce.

"Mexico is growing. From 1940 to 1950 industry, on the whole, increased 25 percent. Some companies, plowing back every peso earnings into new plants, have never yet paid a dividend, preferring to expand their plants.

"Our manufacturers sell all they can produce; supply never seems to catch up with demand. As soon as all the worn-out shoes are replaced, for example, a hundred thousand Indians switch from sandals to shoes. The days of the Revolution are over. We may have floods, droughts, or earthquakes but Mexico appears depression-proof, for the middle class's hunger for goods never lets inventories pile up."

White-collar Class on the Rise

Not too long ago Mexico City had only two classes, rich and poor. The emergence of a middle class is an outstanding phenomenon.

Thousands of people join the white-collar group every year. Each fine Sunday you can see them, out in the family car, hunting new homes in the suburbs. Once they were satisfied with pulque, fermented juice of the century plant (page 814); now they want milk. Cows graze right into the city limits, but cannot cope with demand.

New [illegible] radio whet appetites for gadgets undreamed of by the previous generation. Crowds gather curb-deep outside dealers' windows to watch a TV program, though all they get may be an antique English-language movie.

Prevailing symbol of affluence is the electric refrigerator. That proud possession often rates a place of honor in the parlor where every guest may see it. Sometimes it stands empty, the mistress of the home having no real need of food storage since her Indian maid shops for groceries on a day-to-day basis.

The maid may have an automatic washer at her disposal, but chances are she prefers to pound the family wash on the time-honored concrete slab.

She is a powerful institution, that Indian housemaid. Without her many a Mexico City wheel would stop. In return for lodging and $20 a month, the girl cleans the apartment, tends the children, and buys the food. Sometimes she ekeeps out her income with her own mark-ups on grocery purchases.

A blow to the maid's profit system was dealt by the new grocery chain called *Super-Mercados S.A.* S.A., the Mexican "Inc." stands for *sociedad anonima* (corporation); many visitors figure it means South America. The self-service store's fixed prices and sales slips left the maid no margin. Mexican businessmen opened the first unit in 1946 and soon established more. Now their shops, full of glass and sanitation, threaten the supremacy of Aztec-style street markets where Indian salesmen spread their produce on the sidewalks and, overflowing into streets, clog traffic.

Rising Prices Worry Consumers

Nowadays grocery patrons worry about "the inflation." Salaries have not kept up with prices.

"Rice is sky-high," one resident told me. "Even tortillas, the people's pancake-thin corn bread since time began, have gone out of sight in price."

Mexico's cost of living still seems reasonable to a visiting American, whose dollar buys 8.65 pesos. A single room in a first-class hotel may cost him less than $4, and, if he shops for bargains, he can find a substantial meal for as little as 35 cents. Half that sum pays a barber.

Rents are frozen; some fair apartments go for as little as $30 a month; others range up to $300.

Bus fares for standees run as low as 2 cents. A downtown taxi at a fixed rate is 25 cents.

A Coney Island roller coaster provides no greater thrill than a Mexico City taxi ride.

At dawn, when the avenues were clear, my driver delighted in 50 miles an hour; but midday, when traffic had to slow down, brought the real adventure. Then the cabbie, hungry and irritated, cut in and out of lines. He charged jaywalkers like a bull bearing down

Sands Based de la Retorna Flows into Chapultepec Park's Dense, Primeval Woodland

[illegible]

Church and State Maintain Headquarters on the Zócalo, Site of the Aztec "Teocali"

[illegible]

on a mandory he'd have hurdled the car ahead if he could.

Traffic stacked up; someone beat a staccato rat-tat-tat on his horn, a reflection on another driver's ancestry. Mexicans have learned to curse with their horns, an offense for which they may be fined.

Suburbs Bulge with New Homes

New apartment houses, springing up by the scores, find tenants so eager that some rent from blueprints. Thousands move into new developments called *multifamiliares*, gigantic clusters of apartments erected by the Government to house its workers at low rentals (page 803).

Old-timers recall the days when land beyond Chapultepec Park held only one "crazy" North American, who wanted privacy. He didn't enjoy it long, for subdividers, scenting the way the city was growing, bought up large areas around him. This once-empty space is now fashionable Lomas de Chapultepec; Americans call it Chapultepec Heights (page 759).

"Sites in the hills worth four pesos a square meter 12 years ago are now selling for 100 pesos," residents told me.

The proverbial seashore frontage sold at low tide and flooded at high water here are its equal. I saw "Lots for Sale" supported by nothing as substantial as water; they appeared to be based on sheer air. These properties, facing a ridge road, slanted down like mountain precipices.

Stucco houses were in "California style," the same fashion which California calls Spanish.

Some homes used long, windowless outer walls as sideboards for *jai alai* courts.

Modernistic Homes in a Stony Desert

I found both stucco and *jai alai* courts out of fashion in the newest development, the startling Jardines del Pedregal de San Angel. The Pedregal, a lava-scorched badland, once was the hideout of *El Tigre del Pedregal*, a bandit. Botanists searched its surface for rare flowers, and archeologists dug below the lava for the bones of Stone Age Indians, but ordinary men, afraid of getting lost, shunned the place.

Half a dozen years ago "you couldn't have given Pedregal land away," Mexicans told me. Today builders employing the cactus-grown [illegible] have created a model subdivision where home builders erect the most fantastic and original homes. The natural volcanic rock goes into garden walls (page 800). Caves beneath the rock are turned into dens. Every resident seems to have his back-yard fishpool, a sight which reminded me of the moats in rock zoos. One family has built an aquarium into the walls of its home.

Certain suburban areas are plagued by squatters, who, squeezing in wherever they can find a vacant lot, build shacks of adobe or packing boxes and use rocks to hold down tin roofs.

"My home stands on a 2½-acre lot," one householder told me. "On the same amount of space next door, 326 families have squatted in shanties built all in a line. Fortunately, a high wall separates us, but we can hear the blaring of radios and patting of tortillas day and night. Many of these squatters are Indians fresh from the farm."

Mexico's Federal District, the equivalent of Washington, D. C., has been growing so fast that three million people now rely on public services adequate for a city of 500,000. I saw evidence of growing pains on every hand.

Until the city finishes its 50-mile, earthquake-proof aqueduct, part of it tunneled through mountains, unfiltered water will be suspect, and scarce to boot. Consequently, the capital has become a rich field for United States soft drinks.

Tamales but No Chile Con Carne

At Station XEW I saw a radio show plugging a soda. "*Es delicioso*," said the honey-voiced announcer, "*el Delmonte Punch*." He called it *ponch*. Punsters don't pronounce it that way; they ask for a *de la guerra* (a bond).

Mexican radio time is filled with jingles. One recognizes the familiar Pepsi-Cola song; even the National Lottery has its jingle.

On a still evening one hears the night watchman, an old-fashioned Spanish institution, making his rounds. His soft, melancholy whistle assures householders, "I am on the job," but, according to native jest, it advises robbers, "Here I come!"

Streets resound with the sing-song of vendors crying "tamales" and "*helados*" (ices), but no one ever sings out "chile con carne," a Texas invention seldom eaten south of the border.

Nowadays Mexican store shelves reflect the popularity of American foods licensed for manufacture in Mexico.

Instant coffee is the rage. Without corn flakes, served by almost every café, the Mexican businessman seems unable to start breakfast. United States-made machines vend popcorn "crisp, tender."

Old-style [illegible] newspapers spread on dirt floors, but I saw a Pink Wind. [illegible] nothing of a *sandwicheria* and a Wimpy's Hamburger Stand.

Sombber Picador Astride a Padded Horse Awaits *el Toro* His Professional Duenas

Torrents of Traffic Speed Past Sandstone-clad Palaces on the Passeig de la Reforma

[illegible]

"Girl!" Says the Law, Turning His Pistols on Cars at Jury

Indians in Dress Shawls and White Cottons Visit the Shrine of Their Protector, the Virgin of Guadalupe

[illegible]

• Paper Animals Say Christmas Is Here

[illegible]

Large Adobe Bins Keep Corn Safe from Rodents

Tolerated as Cleopatra's Lover Husband, Becomes a Fashionable Modern Rock City

It is fun to watch Mexicans at their sports. Bowling alleys and swimming pools spring up where there used to be none. *Futbol* and the handsome race track attract tens of thousands. The National University of Mexico's new stadium will seat 80,000.

Bike Riders Pedal up Mountains

On a Sunday drive, I saw thousands of [illegible] bike racers, hair cut short, faces [illegible] with determination, grimly taking to the roads, pedaling up mountains and coasting downhill. Swallowing the dust of passing cars, they relieved thirst by sipping from thermos jugs tied to handle bars. Cross-country porters, backs loaded with pottery, ignored the cyclists, but Monday's sports pages devoted columns to them.

Crowd noises at the *beisbol* stadium, though delivered in Spanish, sound like those in the United States. There are the same low, appreciative rumbles, the same taunts. "Ole! Ole!" the cry of the bullfight fan, is never heard at ball games unless some gallant shouts it at an attractive señorita.

One night friends took me to see a Mexican League game. From them I learned that a *tonron* (pronounced "home rone") was a home run. A *bola* is a ball and a *ponchado* a strikeout. *Serpentineros* pitch curve balls, and *jardineros* (gardeners) catch *flais* (fly balls).

An umpire, however, remains an *umpire*. Since bottled drinks are served in paper cups, he is protected from assassination by the fans, but the players are free to rave at him—and how they do!—as in many a north-of-the-border ball park.

Americans Walk out of Bullfights

Plaza de Mexico, the world's largest bull ring, holds crowds of 50,000. Almost every Sunday sees a *corrida* (run).

Few athletes earn bigger incomes than Mexico's professional matadors. For superlative ones, the piecework rate is sometimes better than $1,000 an afternoon.

Last May, during the off season, I saw three apprentice fighters face six lightweight bulls, two snorting, stamping *toros* to each *torero*.

As the first bull charged into the arena, two New York ladies beside me grew agitated enough. "Shall we leave now?" they asked. Five bulls later they were repeating the question. Several Americans did depart after the first kill, and Mexican boys, watching their chance, grabbed the vacated ringside seats.

"Anything can happen at a bullfight," Mexicans will tell you. I saw fist fights break out in the stands. One spectator fainted. Two bold, audacious urchins illegally leaped the rail, ran into the arena, and engaged the bull, using coats as capes. Professional fighters glowered at the boys, and policemen chased them, but North Americans showered them with coins.

Smaller boys rode the last slain animal out of the ring behind a three-mule team.

Later, in the company of my friend Wayne Rogers, I saw that bull skinned and carved in the slaughterhouse below the ring.

Mr. Rogers, more than a spectator, has killed his bull. He shares the distinction with three other American GI's who studied anthropology last year at Mexico City College. Their story began at a midnight gathering at which they rashly agreed to stage an all-American corrida.

The Yankees trained three weeks under the guidance of a Mexican fighter. They practiced sword thrusts against cactus leaves and cape work against a boy who, stamping like a bull, charged them with a mounted pair of horns.

Veterans Find Mexico Exciting

Mexico City College, alma mater to several hundred American students, put up 4,000 pesos to buy bulls and rent costumes, but the slim toreros' ornate costumes had to be let out to fit the hulking Americans. Rogers wore his old GI shoes because the professionals' slippers were too small.

The spectacle opened in Rancho del Charro's small ring. Each man faced one bull. Mexican spectators were vastly amused when the Americans strove in talking to the bulls in English.

"We entered the ring as if in a trance," Rogers told me. "The bulls promptly bowled over two of us, but we recovered. Robert Blanchard and John Minard dispatched their bulls on the first sword thrust. I succeeded on the second try, and Lester Findlay on the third."

That night the Americans got together at a party and proudly showed off their scars and bruises. Two of them won small roles in the movie, *The Brave Bulls*.

This incident illustrates the high jinks of hundreds of GI's, including a few former colonels, going to college in Mexico City.

Drawing U. S. Government checks of $75 or more a month, the veterans find the dollar stretches farther in Mexico. Some have married Mexicans; their brides assist them as "talking dictionaries," answering problems about the Spanish language.

Hunting takes the GI's to the hot country for jaguar and tapir; deep-sea fishing lures them to Veracruz and Acapulco.*

* See "Wildlife of Tabasco and Veracruz," by Walter A. Weber, NATIONAL GEOGRAPHIC MAGAZINE, February [illegible].

Domed Facade of Fine Arts House Some of the Republic's Most Precious Possessions

[illegible]

[illegible] Americans [illegible] people [illegible] "The income tax is [illegible] Mexicans find it pays to learn English

[illegible]

More and More Mexicans Study English

More Americans [illegible] on the other hand, I met American [illegible] who, left in the care of Mexican [illegible] hardly speak English.

Each year Mexico issues visitors' permits [illegible] Mexicans find it pays to learn English

One day I lunched with a dozen businessmen at the Mexican Bankers Club. As usual [illegible] to politeness [illegible] gentle. I remarked [illegible] word spread [illegible] began [illegible]

On another occasion I attended an English class in the Instituto de Mexicano-Norte Americano Cultural Relations, a nonprofit corporation

Mexico City's Huge *Multifamiliar* Houses Some 5,000 People in 1,080 Apartments

[illegible]

[illegible] government by Mexican and American architects.

[illegible]

[illegible]

[illegible] office work for Mexican and foreign firms and a few well-to-do Mexicans [illegible] in [illegible].

[illegible]

[illegible]

[illegible]

Drinking a Jet from a Wine Flask Is a Hit-or-miss Adventure

[illegible]

[illegible] the Mexican Senate, all [illegible] to learn [illegible]

"We try to interest students in our history, [illegible] and literature," Dr. Eloundo [illegible] "They think America [illegible]

The Institute's [illegible] of North American culture [illegible]

Americans Feel the Lure of Mexico

[illegible] countrymen in [illegible] American Club [illegible] 1955 [illegible] of course.

"Mexico gets in my blood [illegible] tance. "After a rest in the [illegible] beer and hurry back [illegible]

I am [illegible] Mexico is [illegible]

[illegible]

[illegible] a different story if an American girl wears [illegible] attitude [illegible] women are

Boys Sell Antiquity's Stone Masks, Real and Counterfeit, at the Pyramid of the Sun

[illegible]

[illegible] and each should stick to his own [illegible]

"Mexican men prefer American girls," she [illegible] "They feel [illegible] is too good for [illegible] I am trained to bleach my own [illegible]"

A young bachelor tourist [illegible] Mexico City [illegible]

The señoritas are [illegible] courtship can be [illegible] When I call on a girl for [illegible] resort

On several dates I had to take the mother along as chaperon

"Do not take offense," he continued [illegible] Mexican [illegible] he says it. The word, originally a term of endearment, may frequently be [illegible] [illegible] If you blunder through igno-

rance of customs, just say, 'Excuse me. I am only a gringo,' and the Mexicans will love you for it."

With his right hand [illegible] gringo [illegible] tapped his left elbow. [illegible] meant that a man was [illegible] mutilated arm that he [illegible] Monterrey.

"A million stories," he said [illegible] told about the [illegible] people. [illegible] Sales [illegible]

I can find no factual basis for the Monterrey legend. As everybody knows, the city is progressive and its people [illegible] I [illegible] that Mexicans [illegible] Scottish stories; and there is a widely held [illegible] that Monterrey [illegible] many a tale just to get publicity.

Valley of Mexico's Stone-and-adobe Igloos Descend from Aztec Steam Baths

[illegible]

[illegible] "Thumb and [illegible] just a minute." [illegible]

A Tease of Nations Bridge Game

[illegible] his Spanish in Mexico [illegible] one dog bearing [illegible] bark.

Certain other residents of [illegible] Mexico City seemed to have come [illegible] ends of the earth.

Walking into a [illegible] Hungarian, [illegible] Russian and German in Spanish, but were [illegible] the game they generously switched to Russian.

I met a Hungarian opera troupe trying to [illegible] in the United States, and saw [illegible] "New [illegible] had [illegible] he said: "I am Jose Chavez, born in Austria of Spanish parents." One MacGregor, as native as a chile pepper, told me he owed his [illegible] on Mexico's slopes.

[illegible] celebration [illegible] the highway hats of old Mexico, [illegible] to allow, [illegible] as to glisten [illegible] coated, and

the Cathedral's bells pealed.

[illegible] with red and [illegible] [illegible] [illegible] [illegible] [illegible] from bonfires.

Masked Youths Dance by Torchlight

Youths in Indian masks and feathered caps danced around a [illegible] of Mexico.

[illegible] the Zocalo. This place [illegible] images of the Aztecs, who made the square their [illegible] On [illegible] [illegible] [illegible] God [illegible] [illegible] pyramid in [illegible]

Later the Spaniards demolished the [illegible] and [illegible] [illegible] New World's first bull ring in the square.

Thousands Sacrificed by Aztecs

Sidewalk of the Zocalo [illegible] [illegible] art—flat-faced [illegible] stone serpent heads. Here Mexicans uncovered [illegible] [illegible] Stone of the Sun, which [illegible] in [illegible] [illegible] same. For almost a century they kept it [illegible] walled in the Cathedral. [illegible] stone in the National Museum [illegible] of the National Palace which fronts the Zocalo. Its [illegible]

[illegible] National Geographic Magazine [illegible] [illegible] New World [illegible] [illegible] [illegible]

Vendors Sell *gorditas* (Little Fat Cakes) in Honor of the Virgin

[illegible]

piece, the Sacrificial Stone, bears a concavity supposed to have held the hearts of sacrificed victims. The Aztecs, although high in culture, slaughtered thousands of captive enemies as tribute to their gods.*

A few steps away from the Zócalo, an excavation exposes the base of the main Indian temple. News vendors pin their wares to a wire fence protecting its pagan statues. Indian women, devout Christians, stare through the netting utterly indifferent to the work of their ancestors, whose way of life was destroyed by Cortés.

Chapultepec's Bearded *Ahuehuetes*

In all Mexico City there is not a statue to Cortés. Muralists have cartoned him, most politicians condemned him as an enslaver of the Indians. On the other hand, every honor is given to Cuauhtémoc, the Aztec prince, whose army, fighting street by street, causeway by causeway, valiantly resisted the Spaniards.

In the city or its environs are two probable living witnesses to Cortés's triumph. They are Mexican cypresses, called *ahuehuetes*, the "oldest ones" (page 809). Together with a few other groves, these trees are thought to be relics of a vast forest which once covered the shores of Lake Texcoco. Pendant moss gives them the mournful appearance of trees in Louisiana bayous. Some of them compare in mass with California's redwoods.

Perhaps the most famous of these giants is the crumbling specimen in Tacuba. During the Spaniards' retreat from Tenochtitlan on July 1, 1520, Cortés sat nearby and wept over his worst defeat; hence, it is called Tree of the Sad Night.

Chapultepec Park's Tree of Montezuma, one of its 200 ahuehuetes, stands 170 feet high and measures 50 feet in circumference—dimensions acquired after an estimated 700 years. Did Montezuma sit in its shade?

Aztec Sculpture Pictures Montezuma

In Aztec times, Chapultepec's craggy plug of granite, rising abruptly out of flatlands, was crowned with a temple. There Montezuma maintained his summer palace, with harem, hunting lodge, birdhouses, fishing ponds, gardens, and baths. A sculptured bronze grasshopper illustrates the Aztecs' name for the park—Chapultepec, Grasshopper Hill.

In Chapultepec Castle, the museum which now tops the hill, I saw a painting which depicts Montezuma [illegible] with his litterbearers.

"How authentic do you think the portrayal is?" I asked Dr. Silvio Zavala, director of the castle's Museum of History.

"That you can judge for yourself," he replied, "by comparing the picture with the Aztec original."

Under Dr. Zavala's direction I visited a wilderness a hundred feet below the castle. There Aztec sculptors, carving a granite outcropping, pictured their emperor and his court.

A vine-tangled trail shows that the sculpture's existence is known only to a few. The visitor, who has to do a bit of mountain scaling, arrives out of breath.

If you suffer from the climb, think of the Americans who stormed these slopes in 1847 during the Mexican War. They had more than vines, trees, and rocks to contend with: bullets were whistling from the fort, then Mexico's West Point. Teen-age cadets who [illegible] defended the citadel are [illegible] Boy Heroes.

Here Carlotta Kept Watch

History pervades the castle. Its lower story, lined with a broad lagoon, preserves memories of Maximilian and his bride, Carlotta. Facing the balcony, the Empress often stood watching for her husband's return from the Zócalo.

One day in 1867 Mexican patriots took their uninvited Emperor out to a hill in Querétaro and shot him. Carlotta survived until 1927, when, shriveled and insane, she died in Belgium.

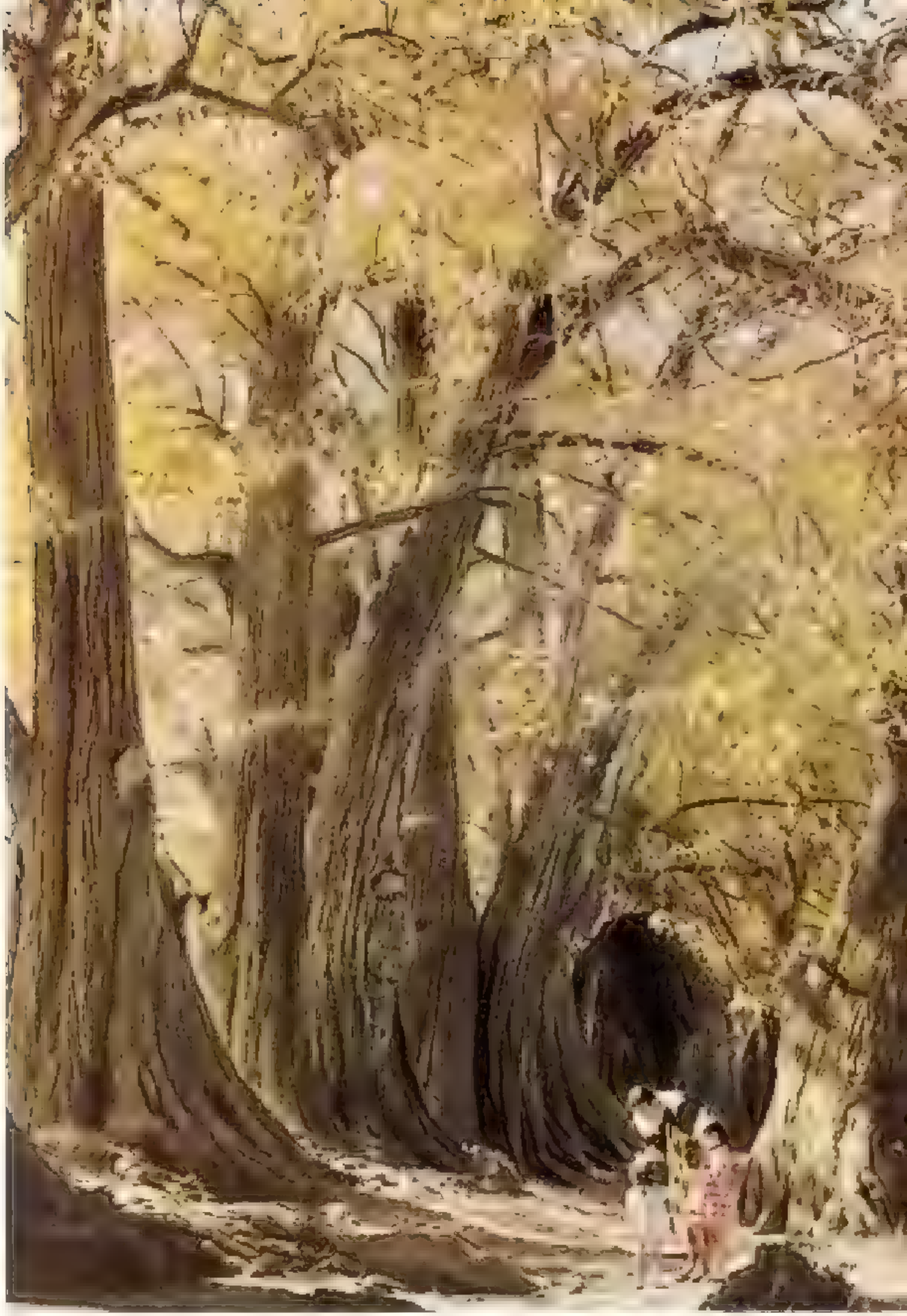
On a Sunday morning Chapultepec's winding drives are thronged with pleasure cars. Horsemen, decked in expensive *charro* cowboy costumes, swing down bridle paths. Lakelets teem with rowboats; children tumble on the grass. Shoeshine boys wander among the crowds, crying "*Grease! Grease!*" An animal trainer spreads a ring for his performers, costumed monkeys on roller skates.

That's Mexico City—steeped in antiquity, seething with life.

* See, in the NATIONAL GEOGRAPHIC MAGAZINE: "In the Eagle of the Aztecs," by Frank H. H. Roberts, Jr., June 1937, and "Lands of Ancient Mexico (Aztec)," by William H. Prescott, July 1917.

For additional articles on Mexico City and its environs, see "NATIONAL GEOGRAPHIC MAGAZINE Cumulative Index, 1899–1959."

[illegible] *ing month's issue. For instance, if you desire the address changed for your February number, The Society should be notified of your new address not later than January 1. Be sure to include your postal-zone number.*



Texcoco's *Hieroglyphic* Creek with Age. Even to the Aztecs They Were the 'Ancient Ones'

[illegible]

Tlahuac, a Greek, Western Vale, Shows Little Change from the Oasis Discovered by Invading Spaniards Four Centuries Ago

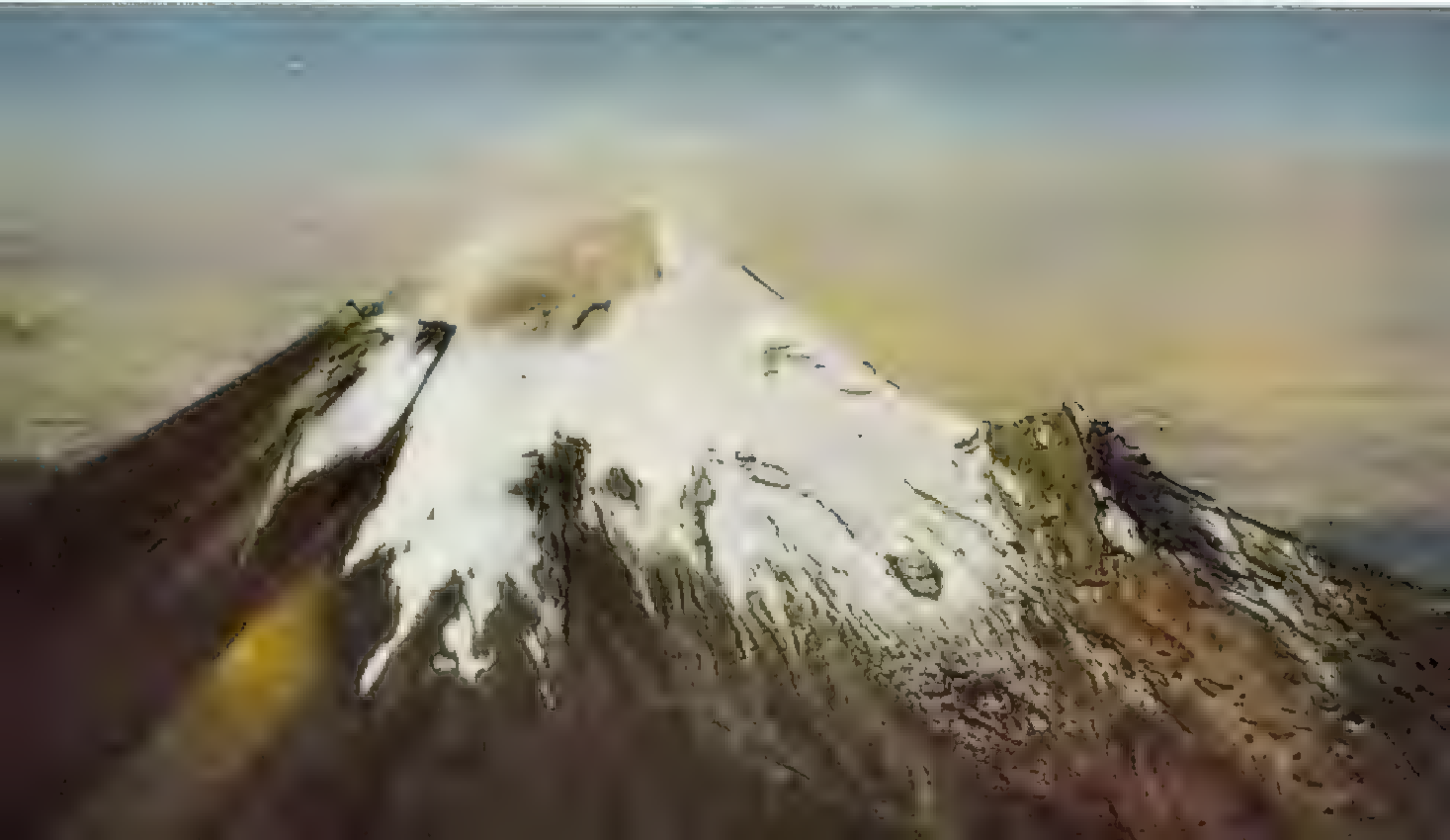
Coyoacán's Church of San Juan Bautista Glowing with Fresh Paint, Plaster, and Gold Leaf

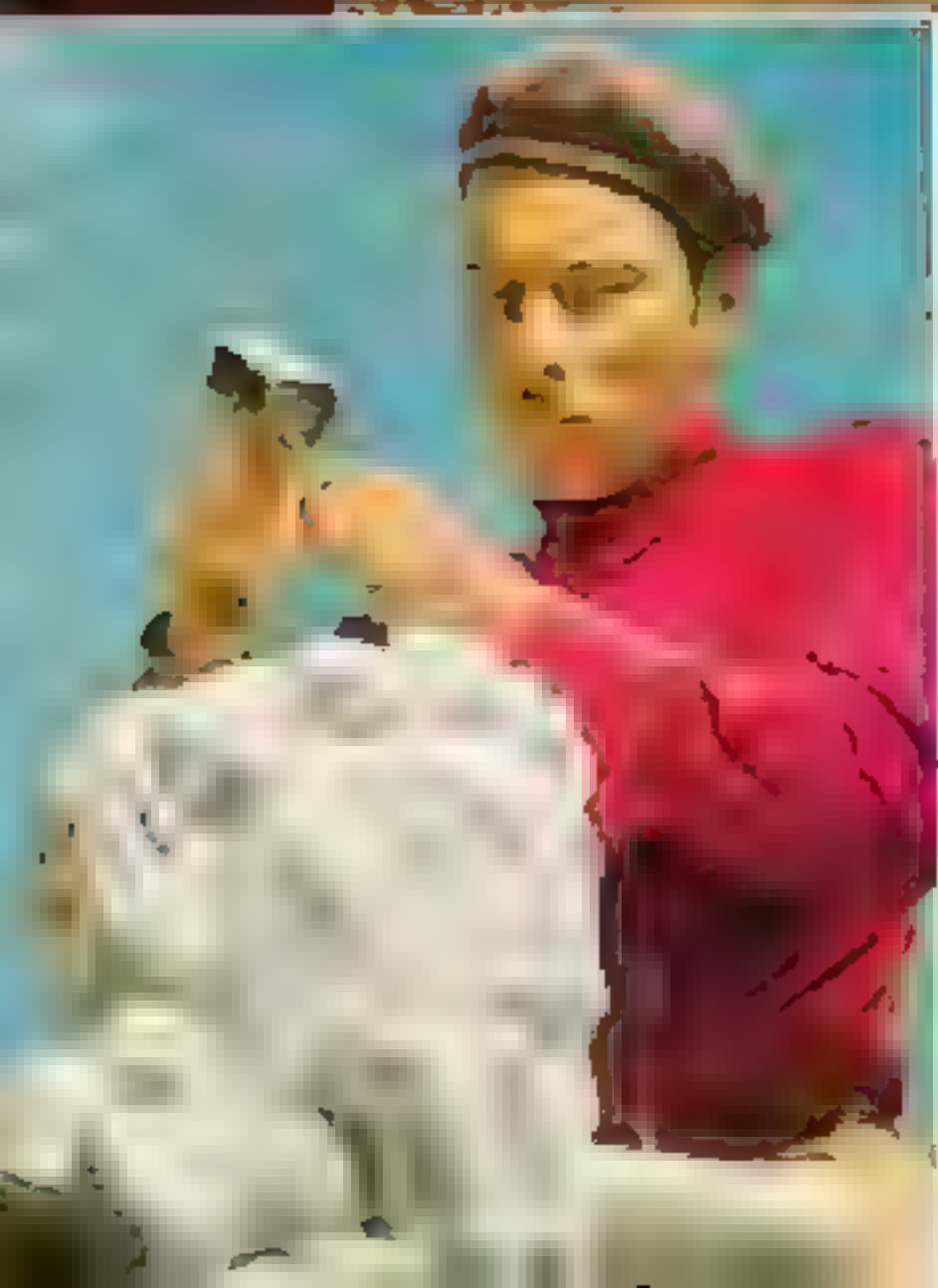
[illegible]

Miguel Covarrubias >
Peintures murales

A Chalula Boy, Using Gourd as Pipette, Sucks Sap from a Maguey to Make Pulque, Favorite Drink of Indians

Popocatepetl, the Aztecs' "Smoking Mountain," Lifts a Snowy Head 17,887 Feet Above Sea Level. Its Jagged Crater Spans Half a Mile





Huehueteotl, Old God of Fire, Wears an Incense Burner as a Hat

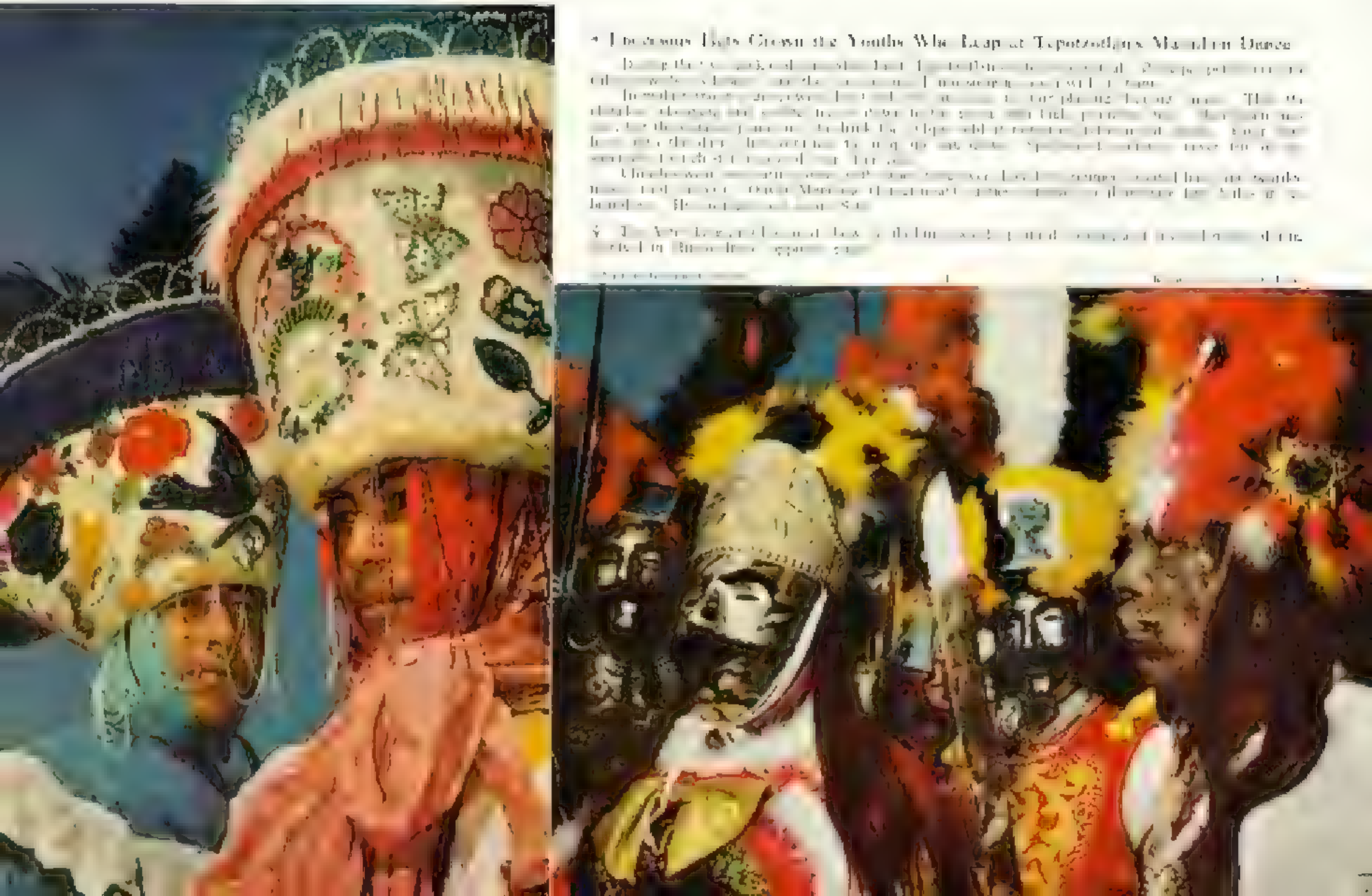
[illegible]

Youngsters Climb the Old Aqueduct Tower in San Bartolo Naucalpan

Naucalpan celebrates the [illegible] of los Remedios. Spaniards [illegible] the War [illegible] served in their army, but Mexicans won victory under [illegible]

Huejutzingo Revelers in Whiskers Masks Celebrate the Romantic Exploits of a Mexican Robin Hood

[illegible]



Tlacaxipehualiztli: Flayer of Men, Feast of Tezcatlipoca, Mexican Dance

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Love of Peace Shines in the Starry Eyes of Children at the Nearby Blessing of the Animals

Mexico City's Dogs, Cats, Lambs, Rabbits, and Birds Go to Church on St. Anthony's Day

Mexico Unfurls Its Cherished Standards on Flag Day. Builders of the Revolution. Left: Lily at Front of the Cathedral

Action! Romance! Battle! Film Makers Slice Drama from Mexico's Warlike Past

[illegible]

[illegible]

[illegible]

Great Stone Faces Reflect Tula's Glory under the Toltecs

The Ghosts of Jericho

By James L. Kelso

Professor of Old Testament, Pittsburgh-Xenia Theological Seminary

With Illustrations from Photographs by the Author

NEARLY EVERY visitor to the Holy Land is drawn, as if by a magnet, eastward along the tortuous black-top road that leads from Jerusalem over the Mount of Olives and down through the dun-colored wastes of the Jordan Valley to the Dead Sea.

As to distance, it is a comparatively short journey—some 30 miles. But it is an adventure in time, for the centuries seem literally to roll backward with each of the 50 minutes or so that it takes to cover the route.

Even though the roadbed has been shifted somewhat to accommodate the motor traffic of the 20th century, it still passes through places with names as significant to the traveler as inscriptions on the stones of his family burial plot. First, there's the Mount of Olives itself, then Bethany, then the Good Samaritan Inn, then Jericho, and beyond it the Jordan River, which runs down to the salty blue landlocked sea.

It's no wonder that the traveler to Palestine seldom feels his journey complete until he has traversed this historic route and at least dipped a hand into the Dead Sea's oily-feeling surf.

Traveling over this tiny bit of geography is particularly stimulating in these days when the cycle of history seems to have come full circle within its limits. The trip is likely to begin at the verge of no man's land on the Arab side of Jerusalem. As late as the fall of 1950, the uneasy truce between the Arabs and Jews was marked by a display of arms on either side of the barriers and an occasional "practice" sniping, especially in the Valley of Gehenna. It was enough to remind the traveler of the pressing problems of our times, of Israel again carved out of this ancient land by the force of arms (map, page 838) *

New Testament Jericho Unearthed

At the other end of the road on the eastern side of this mountain ridge, toward the Jordan River, lies all that is left of the Jericho that fell so long ago to the trumpeting of Joshua's hosts. Now it is only a mound of uninteresting rubble, its mud-brick walls showing here and there. But, as long ago as Neolithic times, it was a proud city.

Even today thousands of Arab refugees get their water from the same spring that supplied that Neolithic settlement. Perhaps it is this concentration of human endeavor in so small a space—the works and mementos of mankind's activities down through the ages, literally piled one on top of the other—that makes the Holy Land so rewarding for the tourist and scholar alike.

In my own case, a professional curiosity has led me repeatedly back to Palestine. I go to probe under the sandy loam with which the winds have covered those many monuments which the ancient Jews must have considered then as enduring as we do our concrete and steel cities of today.

Only last year I followed this much-traveled historic route from Jerusalem to the Dead Sea—and arrived at my most exciting discovery to date. The expedition I headed unearthed New Testament Jericho (p. 837).

Our "find" lies just a little beyond the traditional site of the Good Samaritan Inn, now a coffee shop and police station (page 840). It is some 15 minutes in driving time over the rough old Roman road which branches off the main motor highway at an Arab Legion camp. The ruins are sufficiently well preserved to enable even the least imaginative visitor to reconstruct the scene of some of the Holy Land's most savage and colorful historic episodes.

Winter Capital of Herod the Great

New Testament Jericho, we know from historical records of the times, was the seat of the winter capital of Herod the Great and his son Archelaus. It was here that Herod the Great put to death his innocent young brother-in-law, Aristobulus, the high priest.

Here also died Herod, perhaps the greatest puppet of them all, not excluding our modern Quislings. What is now left of this once fabulous resort has become an Arab national monument and has undoubtedly been inducted by the numerous guides and chauffeurs on their tour of that valley so reminiscent of the traveling ministry of Jesus and the travails of ancient Israel.

When we first arrived over the site where Herod's magnificence had once been cele-

* See, in the NATIONAL GEOGRAPHIC MAGAZINE, "Home to the Holy Land," by Maynard Owen Williams, December, 1950, "Geography of the Jordan," by Nelson Glueck, December, 1944, and "Canoeing Down the River Jordan," by John D. Whiting, December 1940. See also "Holy Lands and the Cradle of Western Civilization," map supplement to the NATIONAL GEOGRAPHIC MAGAZINE, December, 1949.

Sacred to Three Faiths In Jerusalem's Old Walled City, Where Solomon Built His Temple

[illegible]

brated, it was typical Arab farmland. Part of it was brilliantly green with growing wheat. The rest was a wasteland of bramble bushes and a few small palm trees. The Arab name for the location is colorfully descriptive of what we found in early January, 1950—Tulul Abu el Alayiq or "The Hills of the Father of the Bramble Bushes."

The existence of a city at this point, about a mile west of present-day Jericho, had, however, been suspected by scholars and archeologists. In fact, trenches had been dug by Sir Charles Warren as long ago as 1868 and by Ernst Sellin in 1911.*

Before we began our own digging, the major features of the site were two artificial mounds on the north and south banks of the Wadi Qilt at the point where it issues from the steep mountain gorge and debouches onto the Jericho plain. *Wadi* is the Arabic name for a stream that runs only during winter and early spring, the wet seasons.

Historic Site a Grazing Ground

The possible historical significance of the spot was of little interest to the local Arabs who used most of it as a grazing ground for their sheep and goats.

One of our chief early-morning diversions throughout the long months of excavation was to watch the shepherds helping their flocks across the swollen wadi. Their methods have not changed since the time of Christ and recalled His use of the shepherd in parables.†

At high water, the female goats and sheep ignored their young in their own frantic efforts to swim across. While one shepherd drove the flocks, two or three others would stand downstream and catch the helpless kids and lambs as they floated down, then toss them safely upon the bank.

Another unfailingly fascinating sight was these philosophers of the desert—the camels. More often than not, they would wade through the wadi's turbulent waters with their twitching noses high in the air, not deigning to drink despite the fact that the last water they passed may have been a day's march away. Occasionally, too, we spotted a fox at the wadi getting his daily drink.

Although we saw goats in the herds, the goats did not participate in the excavation of Jericho as they did in some of our earlier digs. They had frequently acted like human "kids," scrambling along the walls or sliding down the big dumps where the excess dirt had been deposited.

Across this same wadi there was a daily procession of refugee women who waded the stream with bundles of thornbush on their heads (page 541). They had collected the bush in the wilderness, often as far as five miles from their homes. Some American college girls who visited the excavations could not lift the biggest bundles. Even a load like that was only four days' fuel for cooking.

We began our work at the old trenches dug by Warren and Sellin on the mound on the south bank of the stream. Rapidly we unearthed the remnants of a fortress which, in the end, turned out to be four buildings, constructed at different periods of history. The topmost ruins were those of an Arab fort of the 8th century in which we discovered a marble tablet inscribed with some verses from the Koran. These inscriptions contained early textual material for that book.

This fortress consisted of a thin defensive wall surrounding a group of rooms which in turn shielded an open court. The rooms seemed to have been built from stones taken from earlier buildings on the site.

Incidentally, as proof of the way history piles up in this little corner of the earth, we ran across bully beef cans and beer bottles in uncovering the ruins. The site had been used by British soldiers in World War I. Indeed, the Reverend Edwin Moll, who is now in charge of the Lutheran World Federation relief work in Jerusalem, actually served in the cavalry stationed at this camp.

Beneath the foundations of this Arabic fortress we uncovered parts of a concrete Roman structure which was more likely a public building than a military post. The ground plan of this building had been obliterated by stone looters and by the trenches of former excavators.

Stone looting, incidentally, is not a practice limited to ancient times. Even now anyone digging near a city where building is going on, as it was in present-day Jericho, must hire an honest night watchman who will not sell the stone.

While we could not reconstruct the ground plan, we did find fallen sections of walls, vaults, and piers scattered everywhere, and the debris was full of pieces of painted plaster and plaster moldings. These remnants indicate that the edifice was in keeping with the grand scheme of Jericho which unfolded during our further excavations.

Hellenistic Fortress Dug Up in Palestine

Below this Roman ruin was evidence of a typical Herodian structure. Its walls were made of small stones drafted in the same manner as the massive stone blocks used in the Wailing Wall at Jerusalem or the mosque

* See "An Archeologist Looks at Palestine," by Nelson Glueck, NATIONAL GEOGRAPHIC MAGAZINE, December, 1947.

† See "Among the Bethlehem Shepherds," by John D. Whiting, NATIONAL GEOGRAPHIC MAGAZINE, December, 1929.

Drawn by [illegible] and Irvin E. Alleman

When Lot Beheld Jordan's Green Valley He Likened It to "the Garden of the Lord"

[illegible] was "well watered" (Genesis 13:10). Now the [illegible] rivers are bare, but irrigation canals make the [illegible]

at Hebron over the cave where Abraham and his descendants are buried.

Under the Herodian walls we came upon a Hellenistic tower, probably erected about 200 B.C., either by the Greek-Syrian rulers to keep the Jews down or by the Jews in defending themselves against these overlords. This tower had been built on the flat plain just where it drops off into the wadi, and over the centuries the earth had banked around it to form the mound (page 830).

Most of this debris is from the sun-dried bricks which were the upper courses of the fortress. Herod the Great had evidently leveled off the tower to form a foundation for his new project.

Discovery of the Hellenistic fortress alone would have made our mission a success, for it was the first of its type to be unearthed in Palestine. It had a square exterior and a circular interior to strengthen it against assault by battering rams.

In digging out one of the tower's nine rooms, we went down more than 20 feet. [illegible] the work [illegible] the walls were built of large stones interlaced in the crevices with loose boulders about half the size of a man's head. Nobody could tell when a stone might fall.

Arab Workmen Loyal and Efficient

One of the 150 Arab day laborers whom the United Nations Relief for Palestine provided for the venture said to me, "I pray my God every night this thing won't fall in."

I told him sincerely, "I do the same."

A few weeks later, when working at another dangerous spot, this same Arab had a narrow escape from injury when the ground [illegible] him.

This man, by the way, was typical of the loyal fellows who worked with us. Strong as an ox, he was a jovial and tireless worker. As a foreman, he was a morale builder every

Diggers Remove Jericho's Dust of Centuries and Toss It on a Dump Heap

Here the author brought to light not that ancient Jericho whose walls were felled by Joshua's trumpets but the adjacent, Roman-style Jericho built by Herod the Great [illegible] Modern Jericho, much less illustrious, stands apart from its predecessors. [illegible] owned orange groves near Jaffa, but was in the Holy Land [illegible] them

place he labored, because the other men were delighted to work with him. I was particularly touched by his impulsive act of kissing my hand when we left.

Nearly all the workmen proved highly efficient. Even though there was a turnover every two weeks, the new men caught on fast, and most of them knew they were doing more than just digging. Some who had been professional masons and builders helped volunteerily to interpret many of our problems.

There were refreshing characters among them, too, like another foreman, Sami, who was leader of a jazz orchestra on the side. He could probably have had a job as court jester in the days of Herod.

By and large, however, there was little fun on the dig. The singing I remembered from past years was replaced by a sort of stunned silence. This was not hard to understand for many of these laborers were men who had owned their own orange groves in the rich land around Jaffa between Jerusalem and the sea. There was no horseplay, either, like the famous duels of wit between Abd el Aziz and the Haj, two lawyers who had represented landowners involved in some of the previous excavations in which I had participated.

I was able to renew acquaintance this trip with Abd el Aziz, whose unique features would qualify him to play the part of the Cat in Maeterlinck's *Blue Bird* without usual make-up. But the Haj had passed on to Mohammedan paradise.

On one occasion, I remember, the Haj had been induced to eat some food which he later learned was pork and beans. A deeply religious man, the Haj had made the long pilgrimage to Mecca. He was, therefore, obliged to eat enough salt to bring the pork back up, so that he would not offend against the Mohammedan code. It was [illegible] suspected that [illegible] behind the incident.

[illegible] detail about the Hellenistic tower made our rather hazardous work more rewarding. This was the fact that we found

Arabs Unearth Jericho's Grand Façade from Rubble Accumulated Since the Time of Christ

[illegible]

A Technician Reconstructs a Shattered Roman Wine Jar Found in Jericho's Ruins

[illegible] Herod [illegible] When an [illegible] Jericho, a mile away. Mahfouz [illegible]

[illegible] stone [illegible] Arches [illegible] two stories.

The use of [illegible] in [illegible] was recommended by the famous Roman architect Vitruvius. From the [illegible] we know, our interpretation is that this tower is one of two Thousand Towers which Pompey destroyed [illegible].

Next our work revealed remnants of a grand [illegible] leading [illegible] from the mound to the flat area along the wadi. [illegible] in turn led to a grand fountain. The fountain evidently [illegible] in a [illegible] garden or sports area [illegible] about two city blocks long. The walk was [illegible] in the middle by what [illegible] a [illegible] terrace rising away from the plain in steps.

On each side of it were some 25 [illegible] niches each [illegible] high and three [illegible] wide built into the [illegible]. Flowerpots were found in place in the benches, indicating that the theater-like structure [illegible] sort of [illegible] garden. At each end of the [illegible] were [illegible] large [illegible] the [illegible] the curve of the theater was a mirror pool. After an irrigation ditch [illegible] one day and filled it up, we found that it still holds water (pages 832-3).

Across the wadi, meanwhile, we unearthed the foundations of two expansive winter villas or public buildings with the red plaster still [illegible] on the walls. The brightly colored [illegible] of the [illegible] instantly called to mind Pompeii. Another villa shows downstream on the [illegible] bench of the wadi.

The second artificial mound also yielded [illegible] of [illegible]. The original structure [illegible] been one of heavy brick walls. Within these walls we found two stone forts, [illegible] the other.

[illegible] this fortress we unearthed another room. It was almost intact, and the plaster, painted in bright [illegible] blue, green, and blacks, was as [illegible] as the day it was laid.

It was quite different, however, from the painted plaster of the earlier period found in the villas. Its design imitated the marble slabs that lined the walls of the [illegible] houses. The poor man has always imitated the rich and marble [illegible] still imitated in the painted plaster walls in this land.

Lords and Ladies of Herod the Great's Court Lounged Here in a Terraced Garden

[illegible]

A Magnificent Reflecting Pool Mirrored the Royal Guests and Other Gala Scenes

[illegible] filled with water one morning when an irrigation canal [illegible]

Long before all this was brought to light, we knew we had a real find. I was conducting the expedition on behalf of the school where I teach, Pittsburgh-Xenia Theological Seminary, and the American School of Oriental Research in Jerusalem, of which I was acting as director for a year's term.

A staff of experts assisted me in the work. My associate director was Dimitri C. Baramki, former senior officer of Palestine antiquities under the British Mandate. Others who offered valuable aid included Prof. C. Umhau Wolf, of Chicago Lutheran Seminary, and the Reverend Carl Kissling of Sao, Ethiopia, formerly a professional architect. G. W. Lankester Harding, director of antiquities of the Hashemite Kingdom of the Jordan, and Father Roland de Vaux of the French School of Archeology helped us in assessing the archeological evidence.

It was the Jericho of the Herods all right and, as such, an important political capital of historic significance, second only to Jerusalem itself. In addition, much of it was of a type of pure Roman architecture which had never before been found in the Holy Land and which is very rare anywhere east of Italy.

How Luck Led to Jericho

Actually, it was a combination of good luck and the Palestine political situation that led us to look for Jericho. My original intention when I left the United States in the fall of 1949 had been to return to the scene of some of the earlier diggings in which I had participated—Kirjath-sepher, or, in translation, "Book Town," where I was convinced I could find some important documents similar to the famous ones at Ras Shamra in Syria.*

But Kirjath-sepher turned out to be in no man's land. It had been a border fortress from long before Abraham's time until Nebuchadnezzar's armies finally wiped it off the map. Today it is again a border town.

Then Baramki and I examined a Byzantine church east of Jerusalem, in the Wilderness of Judaea, as a possible site. We had almost decided to dig there when bullets whistled over our heads and hurled themselves in the ruins. We found we were just over the hill from an Arab Legion target range.

Jericho was the next logical choice, because it was in the Jordan Valley, the only area dry enough in the winter for archeological work, and on the Wadi Qilt, which the American school had suggested we explore. And, incidentally, it gave us an opportunity to make use of the magic of the old school tie, which I found to my surprise is just as potent a force in the Near East as it is along the eastern seaboard of the United States.

Because one of the landowners of the Jericho site had gone to the American University of Beirut with Baramki, he let us have use of the land free of charge and didn't even resort to the ancient custom of getting us to bite his friends.

Our exploration of the wadi was to ascertain whether any significant archeological remains would be endangered by an irrigation dam suggested by the United Nations Economic Survey Mission for the Middle East. Except for Jericho, which in any case is below the point where a dam would be erected, and two well-known monasteries, we failed to find any obvious archeological items worthy of protection along the wadi.

Herod's Ghost Seems to Walk the Ruins

As we progressed with our work, it seemed to me that the ghost of Herod literally rose out of the ground and paced the battlements and the façade. For example, we found several skeletons in the ruins, one of which gave evidence of murder. Although this skeleton was much more recent than the time of Herod, it was certainly symbolic of his violent reign.

Then, too, the Roman architecture recalled how Herod had seized his throne only after the Jews had been subdued by Roman legions in the bloody battle of Jerusalem in 37 B.C. It was in keeping with Herod's lifelong subservience to Rome, which is emphasized by the temple he had erected in Samaria in honor of Augustus Caesar. The obvious grandeur of Jericho also was characteristic of Herod, who is remembered for being, among other things, perhaps the greatest builder in the long history of Israel.

In some places the walls we unearthed were four feet thick. They were of poured concrete and faced with small, square based pyramidal stones arranged in diamond shapes. The windows and doorjambs and exterior corners were trimmed with rectangular stones, laid like modern bricks. Despite the care given to putting this diamond-shaped facing on the concrete walls and despite the beauty of its pattern, the outside of the buildings in their prime was smooth white plaster.

This type of construction—the concrete and the small cut stones—was entirely new in Palestine. To discover it was as startling as it would be to come upon Rockefeller Center in the middle of China. Walls like these were common, however, in Rome and the wealthier areas of Italy during the time

* See in The National Geographic Magazine "Secrets from Syrian Hills," July, 1939, and "New Alphabet of the Ancients Is Unearthed," October, 1940, both by Claude F. A. Schaeffer.

Cloth Carpeting over a Mosaic Enables Workers to Remove an Inscription

Thousands of tiny stones set in concrete [illegible] a message from the past. Held by the stiffened cloth, they were removed intact. The mosaic was found in the Byzantine church at Khirbet en Nitla (pages 838–844)

of Augustus Caesar.* The construction is similar to that found in the villa of the Latin poet Horace, for example. Much of Pompeii is of a refined architecture, but there brick was used along with the stone.

The layout itself, as we can picture it from the ruins, was that of a transplanted Roman civic center. As has been indicated, the facade acted as a retaining wall between the hillside and a level area stretching to the bank of the wadi. At either end of the facade, massive walls extended at right angles in the direction of the stream.

Originally there was a third wall, near the wadi and running parallel to the facade, but very little of this remains. Steps lead down from the street level at the western end. What was once a sports arena where the games of Rome favored throughout the Roman Empire might have been conducted, or a garden where the king entertained guests.

Just outside this enclosed area on either end of the façade are units consisting of one large barrel vaulted hall and small adjacent rooms. The front of each hall appears to have been decorated with a small arch at the extreme end followed by a larger arch resting on two pilasters projecting from the wall.

Many fragments of columns coated with fluted plaster were discovered in the debris in front of the east hall, together with many stamped plaster fragments. These columns probably supported a light ceiling of plaster laid on bundles of reeds. The structure would thus have been a pleasant pergola in which royal guests could loll on hot days.

One of these groups of rooms had an 8-inch aqueduct leading into it, suggesting a fancy fountain complex for air conditioning. In the light of these discoveries, our most modern resorts do not seem such a far cry in comfort from those in the days of the Pax Romana.

Coins Point to Archelaus as Builder

While the discovery of the palace's architecture was [illegible] consistent with the history of Herod's life and times. Herod journeyed often to the capital of the great Roman empire to make certain that his political position was solid. Indeed, after one of these visits to the emperor, he may have brought back with him the master architect who created Jericho. It is possible, however, that the walls unearthed to date were erected by his son Archelaus, who reigned from 4 B.C. to A.D. 6.

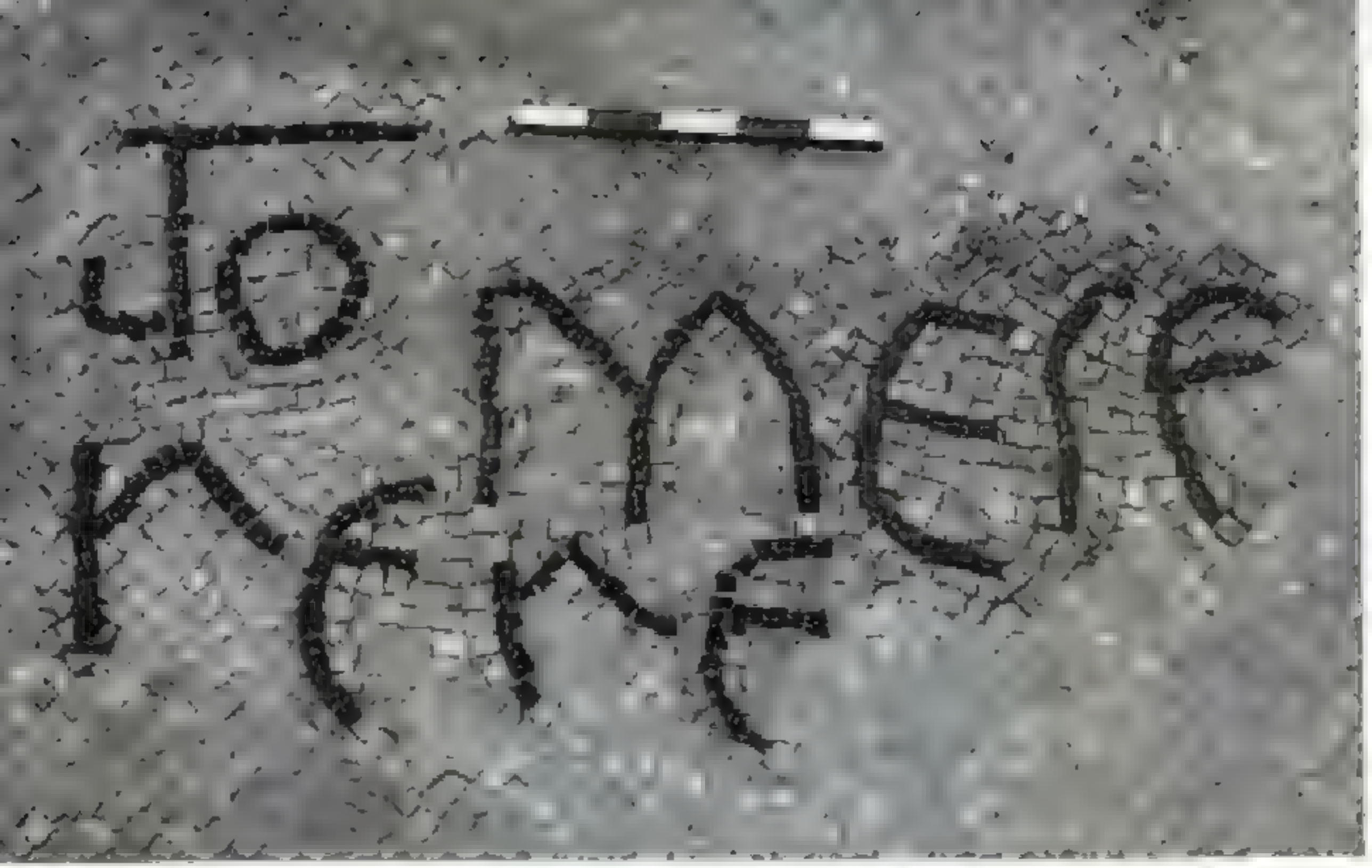
Indicating that Archelaus may have been the builder is a cache of coins found in the ruins. The earliest coin is one of his own and the latest A.D. 86. The coins were under

* [illegible] "Herod's Jericho," by Edith Hamilton, and "Ancient Stone Discovered in [illegible]," by Rhys Carpenter, both [illegible] Augustus—Emperor and Architect," [illegible] October, 1958

Crowning Forts and Palaces Each Built upon the Ruins of Its Predecessor, Even on Artificial Mountains in Origin

[illegible]

At Dawn in the Base Hills, Diggers March to Field Headquarters to Pick Up Their Tools



A Mosaic Inscription from a Byzantine Church Pleads for God's Mercy

After long study scholars have determined that the Greek words [illegible] the first word above stated to God and the first syllable of the second word [illegible] with an [illegible] of the mosaic. The mosaic was taken from the church at Khirbet el-Samra, see New Testament Studies [illegible] 344.

the soil of one of the rooms where they probably had been secreted by some [illegible] in a manner typical of Biblical times.

The historian Josephus tells us that Simon, one of Herod's influential freedmen, led a revolt immediately after Herod's death and burned his palace and other buildings. Archelaus, he recorded, sumptuously rebuilt the palace. In the light of this it was interesting to find that one of the four levels of the first mound we excavated, the one done in the Herodian type of stonework, had apparently been burned.

Rare Snowfall Paralyzes Palestine

In the days when Jericho prospered, the Hills of the Father of the Bramble [illegible] were certainly not so bleak as their name implies. Present-day Jericho, with its small white houses buried in a lush green oasis of citrus and banana groves and date gardens, is indicative of that.

During our four months of intensive work at Jericho the weather was all that one could ask. It was bright and sunny about six days of the week, and much of the time we worked in shirt sleeves.

There are winter windstorms in Palestine, however. One of these swept away the big tent in which we stored our tools; consequently, for the rest of the dig we rented a house. Rooms in a Jericho hotel served as a place to work at reconstructing pottery and other items we found in the ruins (p. 841).

One day all Palestine had such a heavy snowfall that it piled up to five feet in the trans-Jordan hills. This was most unusual. One of our workmen said his grandfather had told him that his grandfather (that would be the workman's great-great-grandfather) had once seen snow in Jericho.

The surprising snowfall marooned us in our Jerusalem headquarters. Nothing on wheels moved very far in Palestine, for tire chains are unheard of there.

Surprisingly, we found new automobiles available at reasonable prices in Palestine. But it takes a jack-of-all-trades chauffeur to drive them. One never goes out in the desert with a driver who is not a good mechanic.

In our own case, we had some harrowing experiences. The school's station wagon had seen better days, and we seemed to have trouble with an overheating rear axle every time we drove in the desert. On one occasion the car actually burst into flames. We put the fire out by smothering it with rags. Then the chauffeur took the wheels apart two or three times without any notable success.

Luckily, it was an Arab holiday, and some refugees who were driving between Petra and 'Amman to a family reunion picked us up. It is an unwritten law of the desert that a traveler must stop and give assistance.

Formerly, the banditry of earlier days would have made this practice rather dangerous. But today the new Government of the Hashemite Kingdom has almost eliminated banditry. Proof is the fact that the Bedouins who once lived by raiding farming settlements are now settling down in the towns.

The Government includes an elected assembly; while we were working, candidates were campaigning for the seats allotted for Jericho. It was just like an old-time American political campaign, complete with songs, banners, and motor parades. The Jericho election was looked upon as very important, because this district, once part of the British Mandate, is new to the Hashemite Kingdom. But the Jericho district has always been important to its rulers.

With proper irrigation—and we found irrigation aqueducts from Herod's time in place—the soil is rich. The owners of the land we excavated now have a fine irrigation system, and their crops testify to the land's fertility. They have tapped a part of the same water sources that the Herods used.

A Wealthy District in Herod's Time

Even the portions of land without irrigation were a mass of wild flowers in the spring, flowers so fragrant that they literally perfumed the air. We found new varieties nearly every day. In the time of Herod this was a wealthy district, famed throughout the world for its balsam groves.

Shortly after Herod became king, Mark Antony forced him to give over the Jericho district to Cleopatra, but the wily Herod leased it back from her for what historians call "the huge rent of 200 talents." The district then was reportedly one of the chief sources of royal revenue in Palestine. Another major source of Herod's income was the copper mines on the island of Cyprus.*

The views here are magnificent. No wonder that so many generations built upon the commanding mound left by the ruins of the Hellenistic tower. From there can be seen the sparkling blue waters of the Dead Sea to the south, and the surrounding cliffs in one of which shepherds from Bethlehem discovered in 1947 the famous Dead Sea scrolls. These scrolls, which were found in a cave on the cliffside, included the famous Isaiah manuscript, older even than Herod's Jericho.

Two mountains on each side of the Wadi Qilt dominate the site of Jericho. On each of these are ruins of a fortress. To the west is the spectacular Wilderness of Judaea. To the east is the jungle of the Jordan River, through which Herod the Great probably roamed in search of game, for hunting is recorded as one of his chief diversions. Still farther east rise the blue-faced mountains and plateau of Jordan, a backdrop to the Jericho stage.

Having been aided to the throne by Roman troops during a veritable massacre, Herod was understandably not popular with his Jewish subjects. He did, however, marry a girl of royal Jewish lineage named Marianne.

Herod was passionately in love with the beautiful Marianne, but she regarded her husband, who was not of royal blood, as an upstart and did not reward his affection.

Herod Eliminated Rivals by Treachery

Even his love for his wife did not stay Herod's hand when he saw that her young brother, Aristobulus, was being received enthusiastically by the crowds as high priest.

Herod had appointed Aristobulus to this position in a move to curry favor with the people, but he was not willing to put up with a potential rival. When they both attended a banquet at Jericho—probably a gay occasion given over to uproarious games and swimming in the pools of the palace garden—Aristobulus was somehow drowned. Professing the deepest grief, Herod gave his brother-in-law a magnificent funeral.

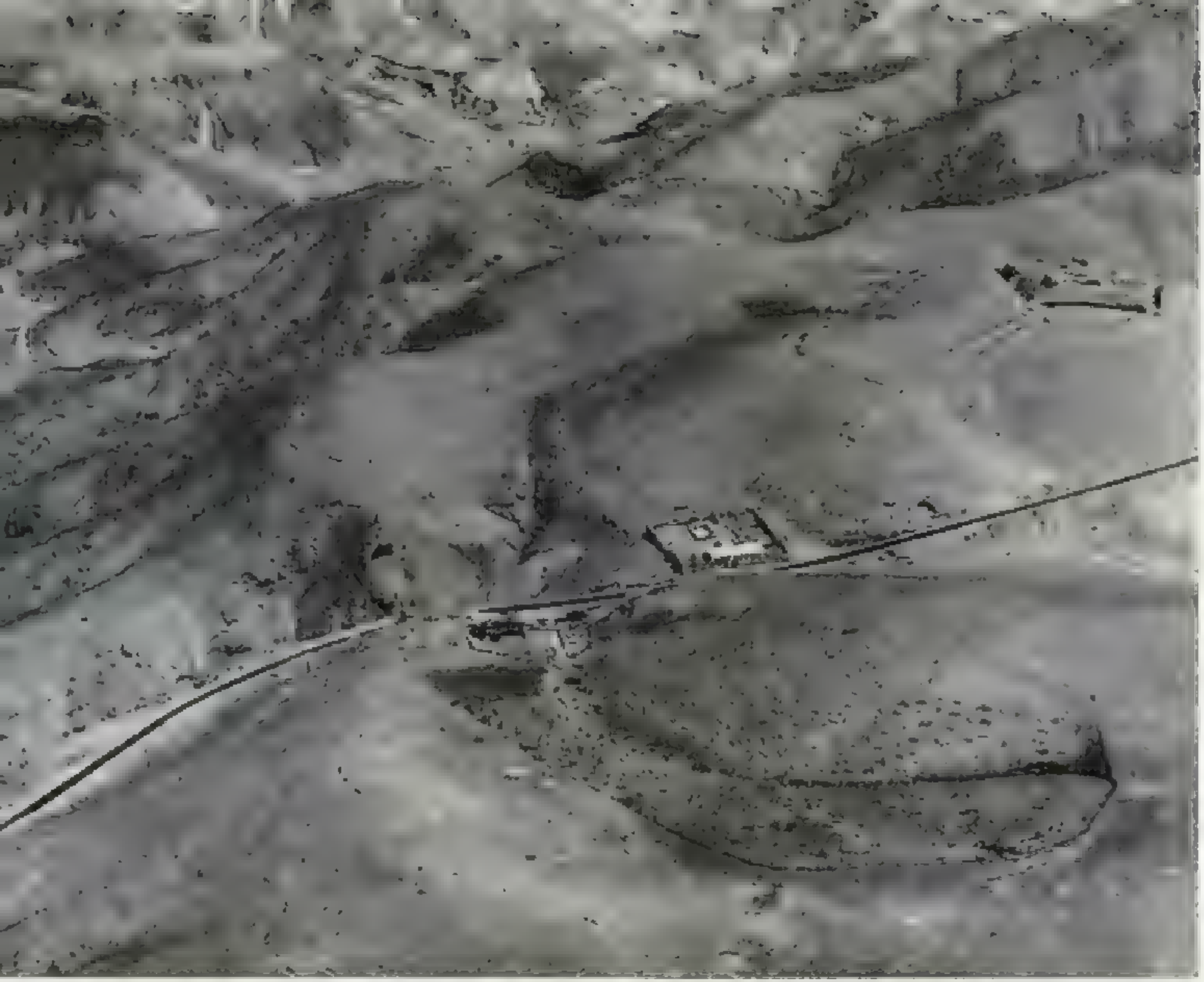
Six years later, 29 B.C., Herod, a dupe of his own fierce jealousy and a plot laid by his conniving sister, Salome, had Marianne put to death on charges of being false to him.

Jericho again figures in the annals of Herod as the place where he staged one of the first public trials of his sons by Marianne, Alexander and Aristobulus. Largely as the result of further plotting by Salome, who, incidentally, is not the Salome referred to in the grisly story of the beheading of John the Baptist, Herod believed Alexander and Aristobulus were planning to take his life. After repeated trials and reconciliations, he was finally convinced that his fears were true and ordered them to be strangled.

Herod apparently took a long time dying at Jericho. Accounts by Josephus indicate that he suffered cancer of the bowel. While he was on his death bed, he was called upon to deal with an outbreak of religious fervor. It was occasioned by the fact that Herod caused a golden eagle to be erected over the great door of the Temple in Jerusalem, which he had rebuilt as a sop to the religious feelings of the Jews. The eagle was apparently Herod's way of trying to reconcile his devotion to his national god with what was perhaps a stronger devotion to Rome.

At any rate, the eagle outraged the Phari

* See, in the NATIONAL GEOGRAPHIC MAGAZINE "American Fighters Visit Fabled Lemnos," March, 1946, and "Unspoiled Cyprus," July, 1925, both by Maynard Owen Williams.



Good Samaritan Inn Now Serves Coffee to Motorists

[illegible]

Fuel Is Scarce in the Desert. Walking Thornbushes Bear Spare Loads of Twigs for Cooking Fires

sees, the strictest of the Jews in upholding the religious law which forbade the use of any images. Two Pharisee doctors harangued their students about this eagle to such a point that, when a rumor went around that Herod was near death, a group of the students scaled the Temple porch, let themselves down by ropes, cut away the eagle, and, in the presence of an admiring throng, hacked it to pieces.

An assembly of Jewish notables was immediately convoked in the theater at Jericho, and Herod was carried in on his sick bed. The old man wrathfully admonished the group. When they told him there had been no general sympathy for the deed, Herod yielded to their pleas that only the guilty parties be punished. Forty students were executed, those who actually cut the eagle down being burned alive, as were the two professors.

Given a Magnificent Funeral

Finally, in March, 4 B.C., Herod died. He was given a funeral suitable to his title, the Great. His body, clad in royal purple, a scepter in his hand and a crown on his head, was borne on a golden bier from Jericho to Herodium, where it lies today in that magnificent ruin still showing parts of its walls out of the earth south of Jerusalem.

The story about the eagle gives rise to speculation as to just what was in the statuary niches along the Jericho façade. Herod, we know, except for the glaring example of the eagle, was ordinarily scrupulous in avoiding injury to the religious sensibilities of his subjects by erecting statues. No evidence of any statuary was found in the ruins, but then statues are among the first spoils of war in any era. The niches were large enough to have been adorned by small trees.

The eagle story also poses the question of the location of the theater in which Herod appeared to pass judgment on the culprits. There are evidences of two large theaters in the area. Whether any significant ruins can be recovered remains to be seen. We know that it was often the Roman custom at this time to use wooden seats in theaters, much as we do in our bleachers today.

Immediately after the death of Herod the Great, Archelaus, who was named successor in Herod's will, ascended the throne provisionally until the Emperor Augustus could rule finally on the succession.

Archelaus had been educated and spent much of his adult life in Rome. Although the people were more or less willing to give him a chance, he started his rule badly by ordering the army to quell riots. The result was another massacre, in which 3,000 were slain.

While Archelaus and his ministers were in Rome getting his title to the throne settled, disorders broke out all over the kingdom. The unrest apparently convinced Augustus that it would be easier to continue controlling the Jews through vassal kings than to establish direct Roman rule. So the Emperor approved Herod's final will and split the kingdom into three sections, over which he placed Archelaus and his two brothers, Antipas and Philip, as rulers. Archelaus got the lion's share with the title of ethnarch and the promise that he would be king should he prove worthy.

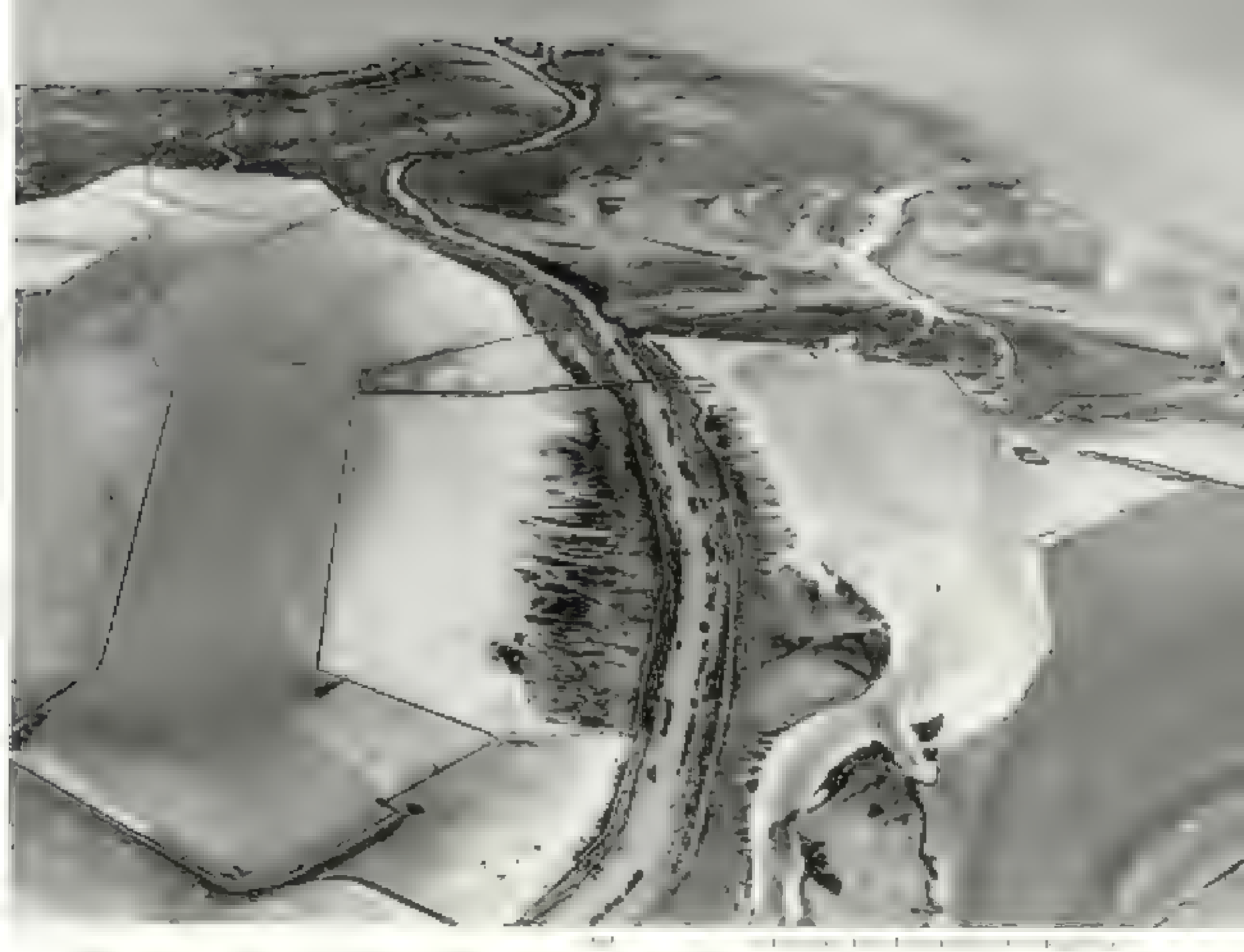
While historians report that Archelaus's rule was "tolerably efficient," he seems to have aped his father's methods and treated his subjects harshly. The seriousness of the situation was indicated by the fact that the Jews and Samaritans, normally bitter enemies, combined to complain to the Roman emperor in the year 6. Archelaus was deposed and banished to Gaul, where he lived out his life.

Meanwhile, Rome took over Archelaus's portion of the Holy Land and administered it directly for the next 35 years. This accounts for the presence of Pontius Pilate, the procurator who figured so prominently in the Gospels. One Herod of the Gospels, the tetrarch who ruled over Galilee and ordered the head of John the Baptist produced on a platter for his young stepdaughter Salome, was Archelaus's brother, Antipas.

Where Jesus Abode with Zacchaeus

But, even as Herod's gory ghost haunted the battlements of the Jericho we excavated, these same walls were hallowed in our minds by the memory of another who walked that way. Jericho was the last city visited by Jesus as He made His way to Jerusalem to face the Crucifixion. This incident is recorded as follows by St. Luke (19:1-7):

> And Jesus entered and passed through Jericho.
>
> And, behold, there was a man named Zacchaeus, which was the chief among the publicans, and he was rich.
>
> And he sought to see Jesus who he was; and could not for the press, because he was little of stature.
>
> And he ran before, and climbed up into a sycamore tree to see him: for he was to pass that way.
>
> And when Jesus came to the place, he looked up, and saw him, and said unto him, Zacchaeus, make haste, and come down; for today I must abide at thy house.
>
> And he made haste, and came down, and received him joyfully.
>
> And when they saw it, they all murmured, saying, That he was gone to be guest with a man that is a sinner.



River Jordan, Flowing Past Salt Pans, Meets the Dead Sea 1,286 Feet Below Ocean Level

The Old Testament [illegible] bodies of water the Salt Sea. Arabs speak of it as the Sea of Lot. Greeks named it the Dead Sea [illegible] the Asphalt Sea. Egyptians prized its asphalt as embalming material; the [illegible] comes from it. Arabic [illegible], meaning asphalt. Today [illegible] and valley [illegible]. Only marine organisms can withstand its heavy brine content.

I think it can be said with certainty that, if he did not actually live in one of the villas on the north bank of the Wadi Qilt, Zacchaeus lived in a similar house in this general section of Jericho. For one thing, he was rich, and all that we have uncovered so far is the wealthy section of the city. For another thing, Zacchaeus was obviously an important man in so far as the Roman rule was concerned. He was what you might call an assistant secretary of the treasury, with headquarters at the winter capital.

Just where the sycamore tree incident took place would be difficult to say. At any rate, there is still a splendid sycamore fig tree with a trunk about five feet in diameter on the road north from modern Jericho. It is a sight no visitor should miss, for it brings to life the story of Zacchaeus.

It was along the road outside of Jericho that Jesus healed two blind men (Matthew 20:29-34). The blind are still a common sight in Jordan and, on the days when we hired new workmen, the blind came and pleaded that their sons be hired. We were always glad to comply.

A more accurate pin-pointing of some of these historical events was among the many riddles we were forced by the passage of time to leave to other scholars. Happily, the work is continuing this year under the auspices of the American School. There will be much more to find. For one thing, we did not locate the great public buildings, such as Herod's palace, which we assume are buried there. Indeed, as soon as the wheat was harvested from the land just west of the southern fortress, foundations of a large edifice appeared.

In addition to more buildings, there should be some valuable inscriptional material. Inscriptions are difficult to find in Palestine where most of such work was done on limestone, which washes with the rain. In this case, however, it is reasonable to suppose that inscriptions may be legible, since the wood we found preserved in the Hellenistic fortress attests the dryness of the climate.

Other intriguing questions yet to be answered are: Just what caused the downfall of this fabulous resort? And why didn't the poor move in and take over, as they generally

have elsewhere? The city seems to have declined about the 3d century, and there is no evidence of the poor ever having lived in the portion of Jericho we dug up except during the brief Arab reoccupation of the 8th and 9th centuries.

Whatever is uncovered will be left for the world to see. The Hashemite Government has issued instructions that anything of general interest be kept above ground, open to the public. It unmistakably hopes that one day Jericho will rival Pompeii, where buses bring people by the hundreds daily to scramble over the historic remains.

A Dig near Where Jesus Was Baptized

Not nearly so interesting but worth reporting is a minor dig we conducted at Khirbet en Nitla, a few miles to the east. The site was just off the dirt road leading to the traditional scene of Christ's baptism. The baptism at the hand of John the Baptist is supposed to have taken place near where the Wadi Qilt flows into the Jordan River.

The site where we dug has in the past aroused the interest of many explorers. It derives its name from a nearby tamarisk tree, preserved probably because it is considered sacred. The fact that the Arabs, desperately in need of fuel, allow these trees to stand is a carry-over from the Canaanite religion.

Although some archeologists have identified this place as the site of ancient Gilgal, where Joshua set up headquarters and marshaled his hosts for the advance on Jericho, we found no evidence of ancient occupation.

We did, however, uncover at Nitla the ruins of a church which had undergone many changes in construction and repair between the 4th and 9th centuries. The original [illegible] was a [illegible] basilica of stone. Each successive rebuilding was only a small chapel of poorer materials. But there were mosaic floors containing intriguing inscriptions—scholars have now decided that the inscriptions are in Latin (pages 835, 838).

Joined to the church were remains of a monastery with tiny rooms that were truly cells. This is one of 18 monasteries in the Jericho district. Only Jerusalem itself boasts more.

The church and monastery at Nitla were just more bits of evidence of the centuries of living which have made this Jordan Valley so rewarding to the curious. Some of these skeletons of a past civilization, like Phasaelis, the city to the north of Jericho which Herod the Great built in honor of his brother, still lie beneath the loam. We had intended to dig this site, where buildings still show through the ground, but time prevented it.

But there are many spots, among which New Testament Jericho now takes its place, for the tourist to see. For example, there is the breath-taking sight of St. George's Monastery hanging on the cliffs above the Wadi Qilt, west of Jericho. And along the main motor road from Jerusalem is a tomb dating from the time before Moses. Somebody tried to fashion it after the Egyptian pattern.

Down where the road levels off onto the plain is Nabi Musa, the famous Mohammedan shrine in which the bones of Moses are supposedly interred. North of present-day Jericho, beyond the sycamore fig, there is Old Testament Jericho with its great spring, still the source of water for the blooming orchards of the modern city. Not every visitor will be as lucky as the mining engineer who several years ago spotted a gold Assyrian ring among these ruins.

Beyond here, at Khirbet el Mefjer, lie the ruins of a majestic Ommiad palace which was under construction when the mighty earthquake of the 8th century shook it down.

Above all this towers the lofty Mount of Temptation, from which the whole valley can be seen as an inspiring panorama. Mount Hermon is visible far to the north, and to the south the eye travels across the Dead Sea into the jumble of mountains of the Araba.

Air Mail by Donkeyback

The journey to Arab Palestine can be made even in these troublous times. Trans World Airlines and Pan American Airways planes land at Cairo and Beirut, respectively. From there other planes fly to Kalandia Airport, the Arab field for the divided city of Jerusalem.

There is a curious paradox in the fact that air mail must be carried by donkey through the streets of the old walled city, too narrow for automobiles, since the division of Jerusalem has shut off the motor approach to the post office.

Visitors coming by sea may land at Beirut and motor over the scenic Lebanon Mountains, through the age-old city of Damascus, and down the desert's edge to Amman, capital of the newly created Hashemite kingdom of the Jordan.

However they arrive in the Holy Land, it is certain that in years to come travelers will still yield to the temptation to go eastward toward the Jordan. Perhaps they will feel that the opportunity to see the wild which Jesus must once have looked upon is at least as compelling a reason for their journey as the popular custom of taking a moonlight dip in the Dead Sea.

For additional articles on the Holy Land see "National Geographic Magazine Cumulative Index 1950-1960."

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In addition to the editorial and photographic services [illegible] being used, The Society has sponsored more [illegible] years of field work to achieve these objectives.

The Society's notable expeditions have probed back to [illegible] Indian [illegible] in Northeastern [illegible] to a point near [illegible] in Lake Superior crossed the Atlantic. By dating the ruins of the [illegible] mound dwellings in that region, The Society's geologists solved secrets that had puzzled Europeans for [illegible].

In Mexico, The Society and the Smithsonian Institution [illegible] discovered the oldest work of [illegible] on the American for which we have a date. The stela [illegible] is engraved in Mayan characters with a date which [illegible] Spinden [illegible] Correlation. It antedates by 200 years anything hitherto dated in America, and [illegible] a great center of early American [illegible].

[illegible] to a flight sponsored jointly by [illegible] Society and the U. S. Army Air Corps [illegible] Explorer II was carried to the world altitude record of [illegible]. Albert W. Stevens and Capt. Orvil A. Anderson took along [illegible] nearly a ton of scientific instruments, and obtained results of extraordinary value.

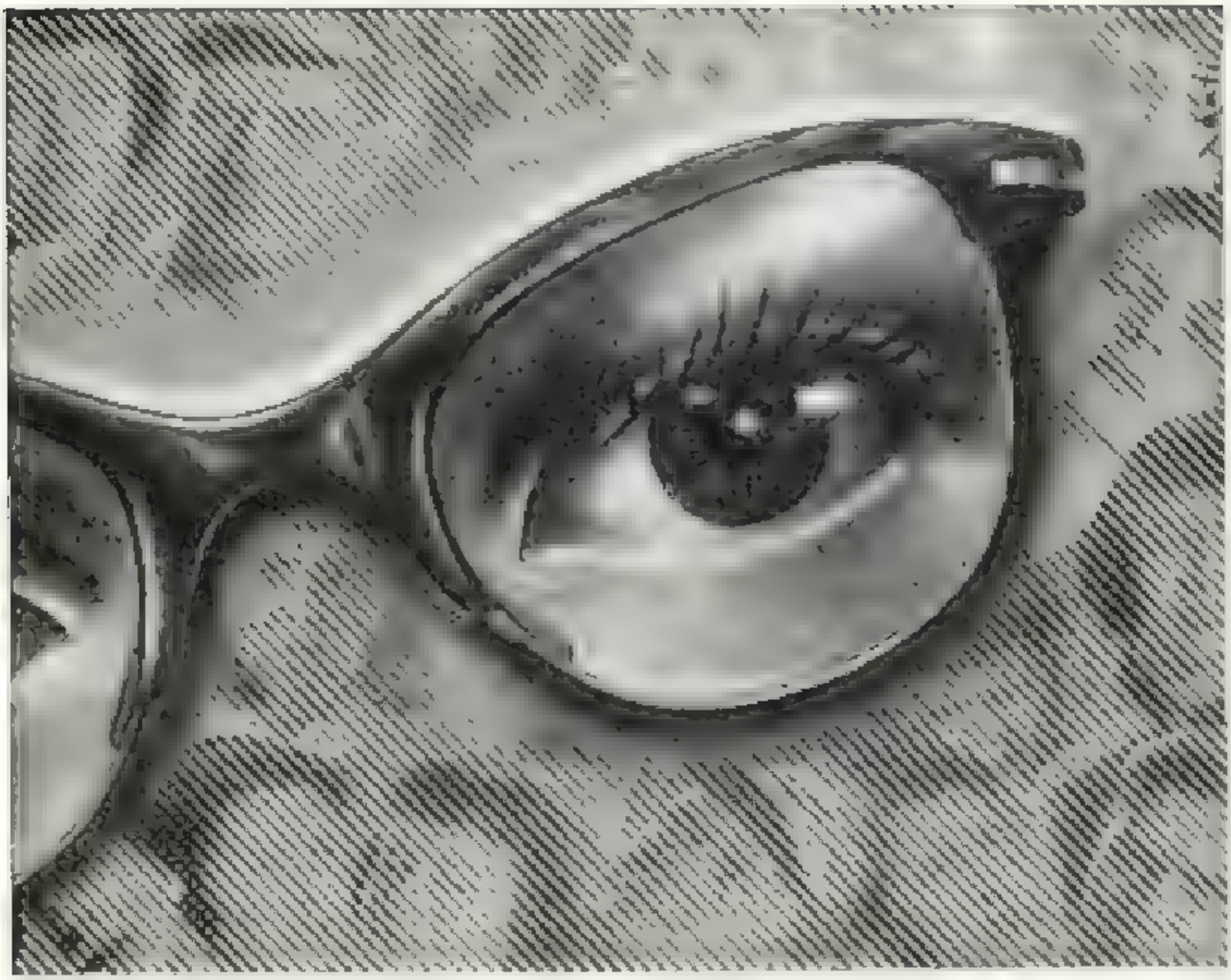
A notable undertaking in the history of astronomy was begun this today by The Society in cooperation with the Carnegie Institution of Washington and the California Institute of Technology. The Society will provide four years to photograph the vast reaches of space and will provide the financial plan for observatories all over the world.

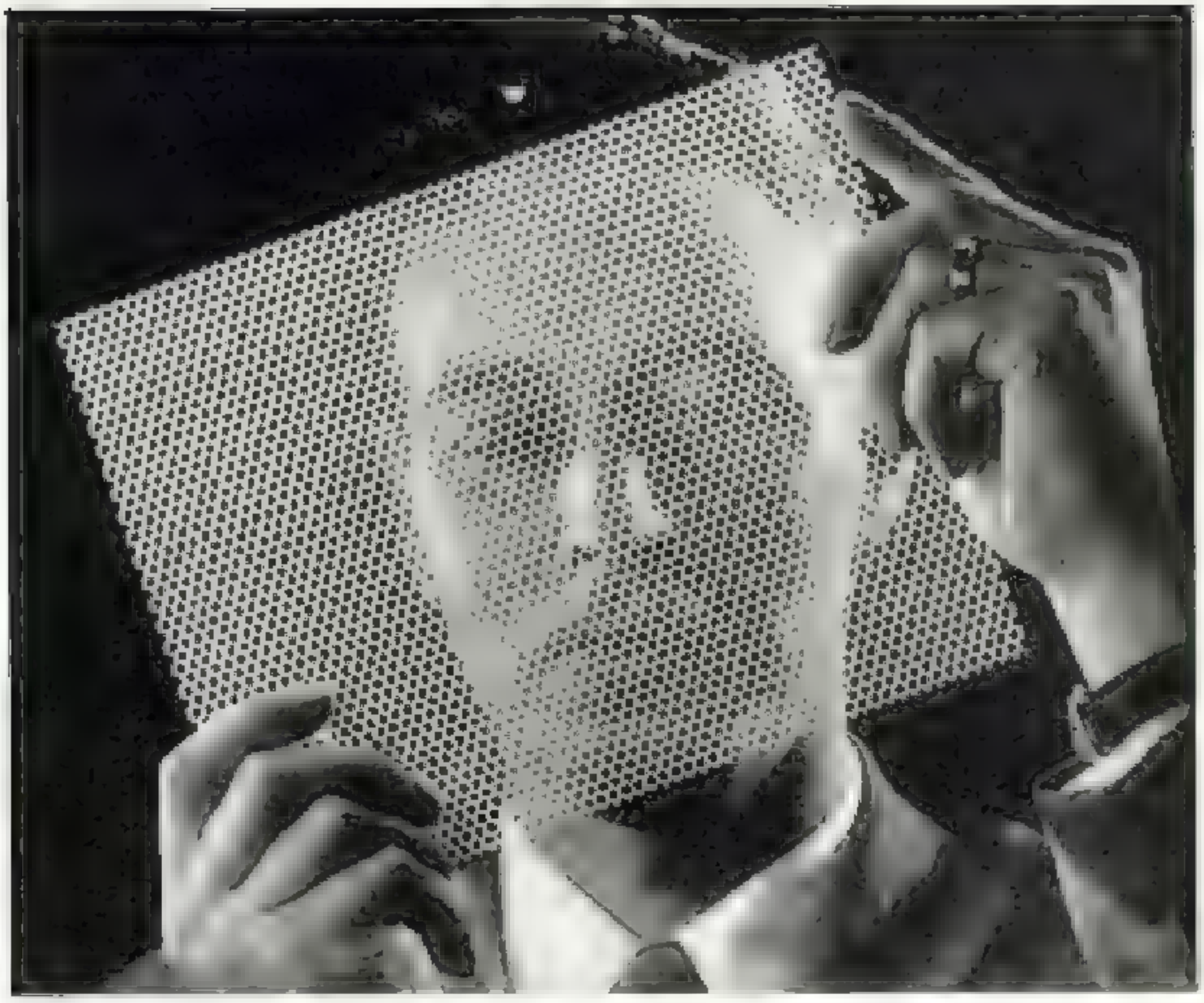
In 1938 The Society sent out seven expeditions to study the effects of the sun [illegible] from Borneo to the Arctic. The fourth series in two decades probed remote corners of North America and Asia.

The Society granted $25,000 and in addition $5,000 was contributed by noted individuals to help preserve forever a American [illegible] of the giant sequoia trees in the Giant Forest of Sequoia National Park of California.

Chief of the world's largest icefields and glaciers [illegible] to the polar regions was discussed in Alaska and Yukon by Bradford Washburn, while expeditions for The Society and the Harvard Institute of Exploration, 1938

Shown above: 1. [illegible] 2. [illegible] 3. [illegible] 4. [illegible] 5. [illegible] "[illegible]" [illegible]





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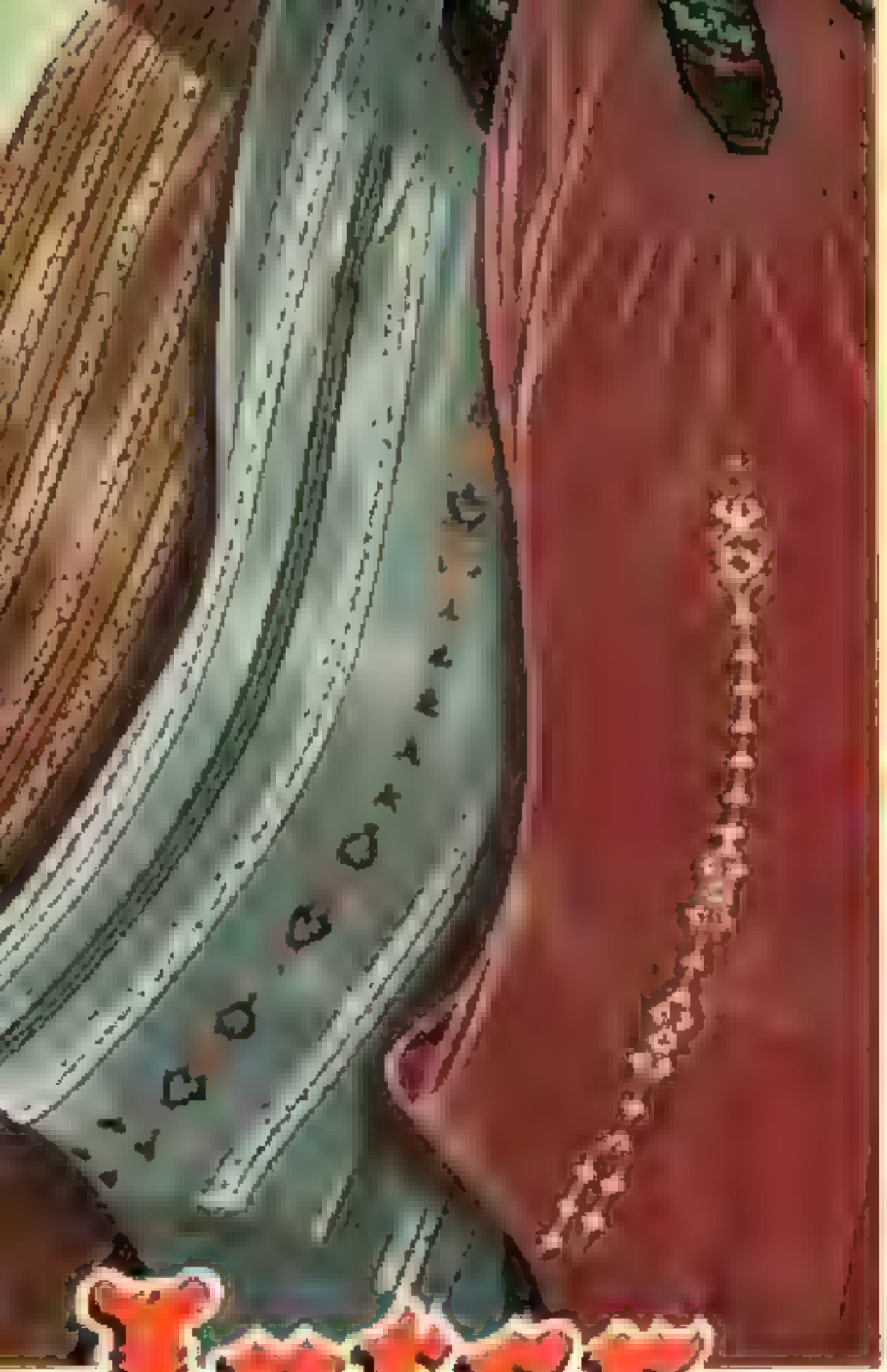

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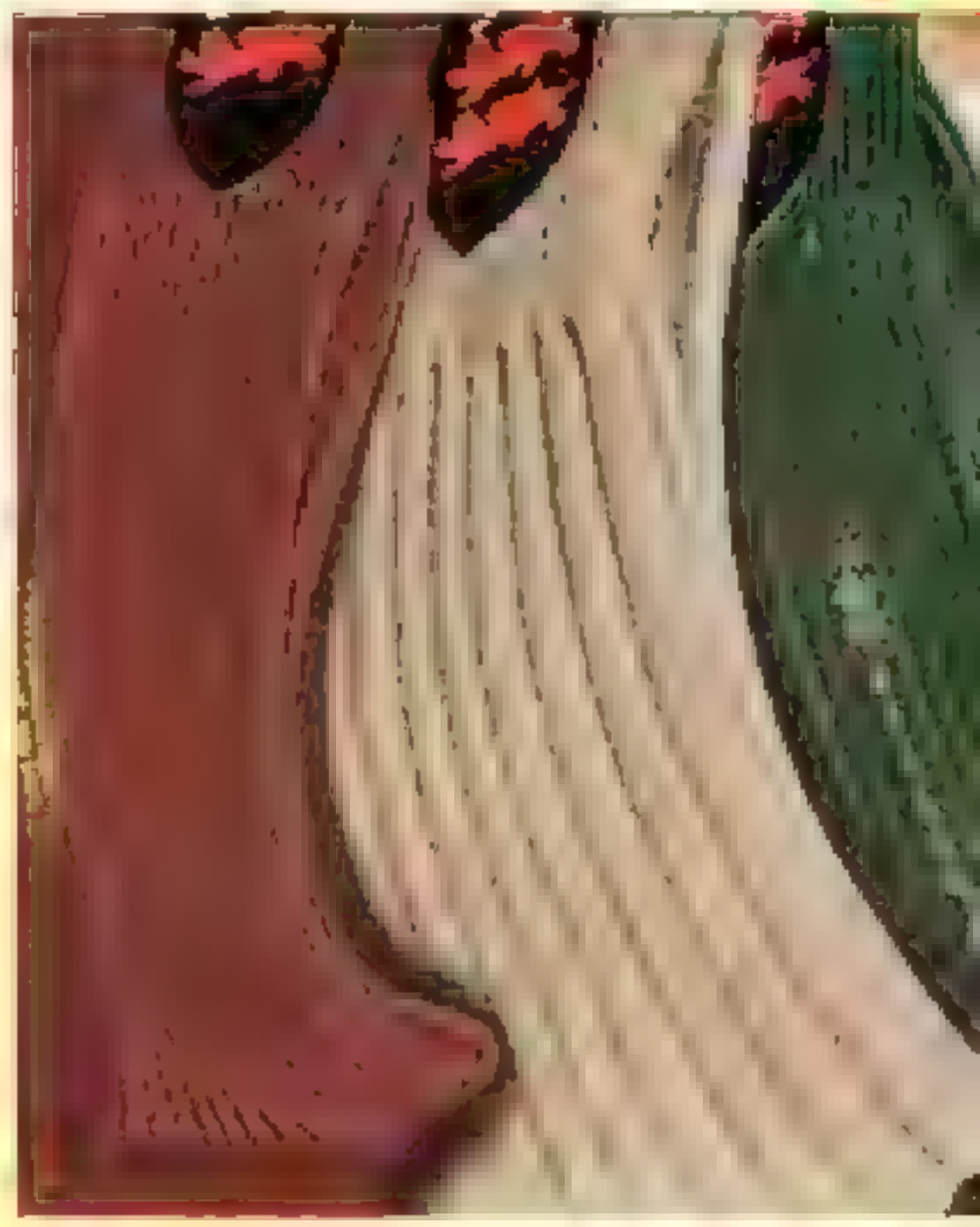

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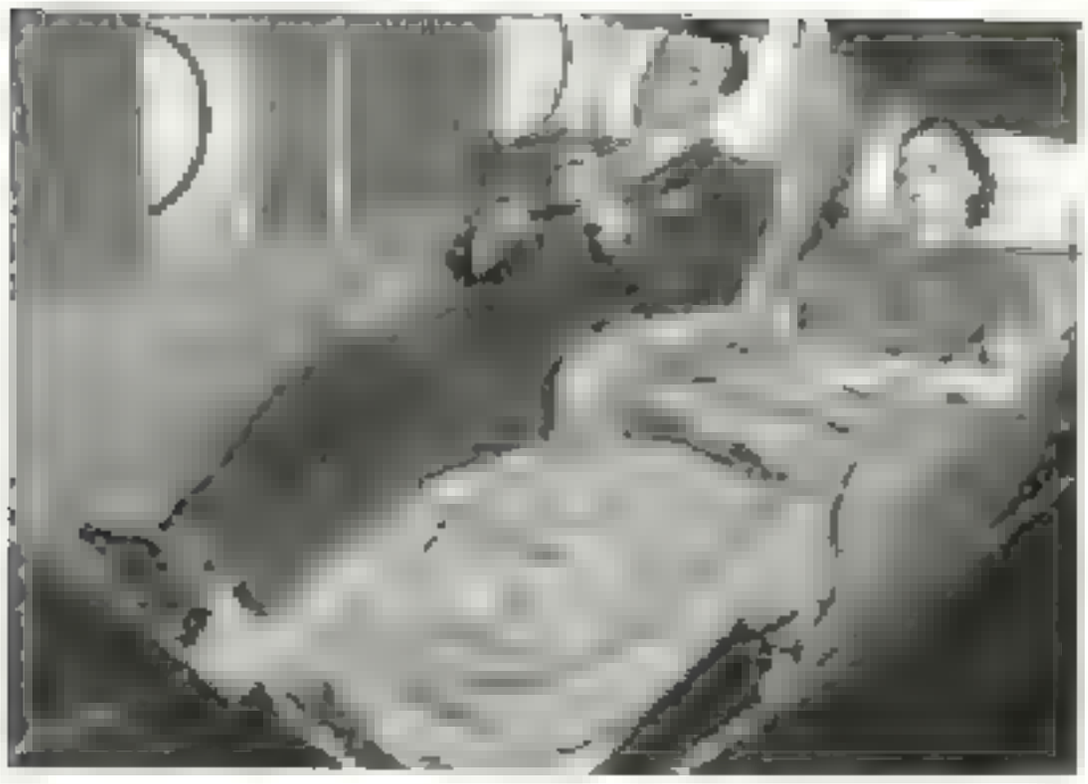

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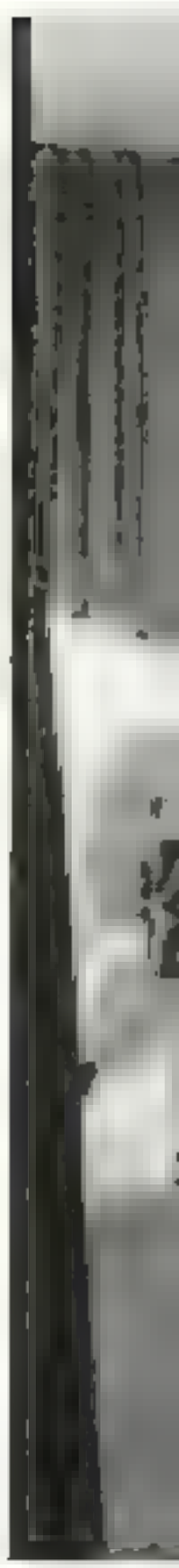

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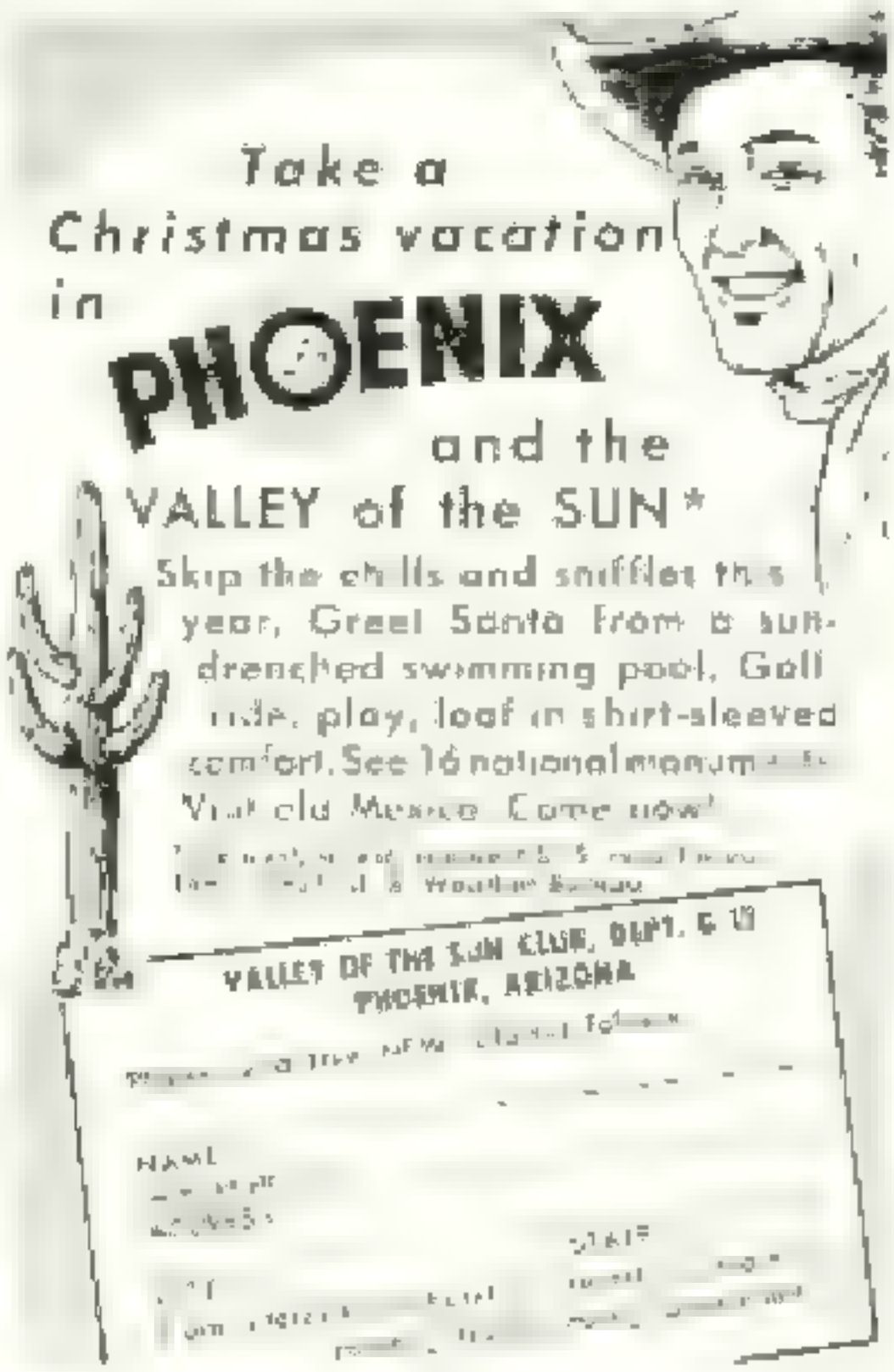

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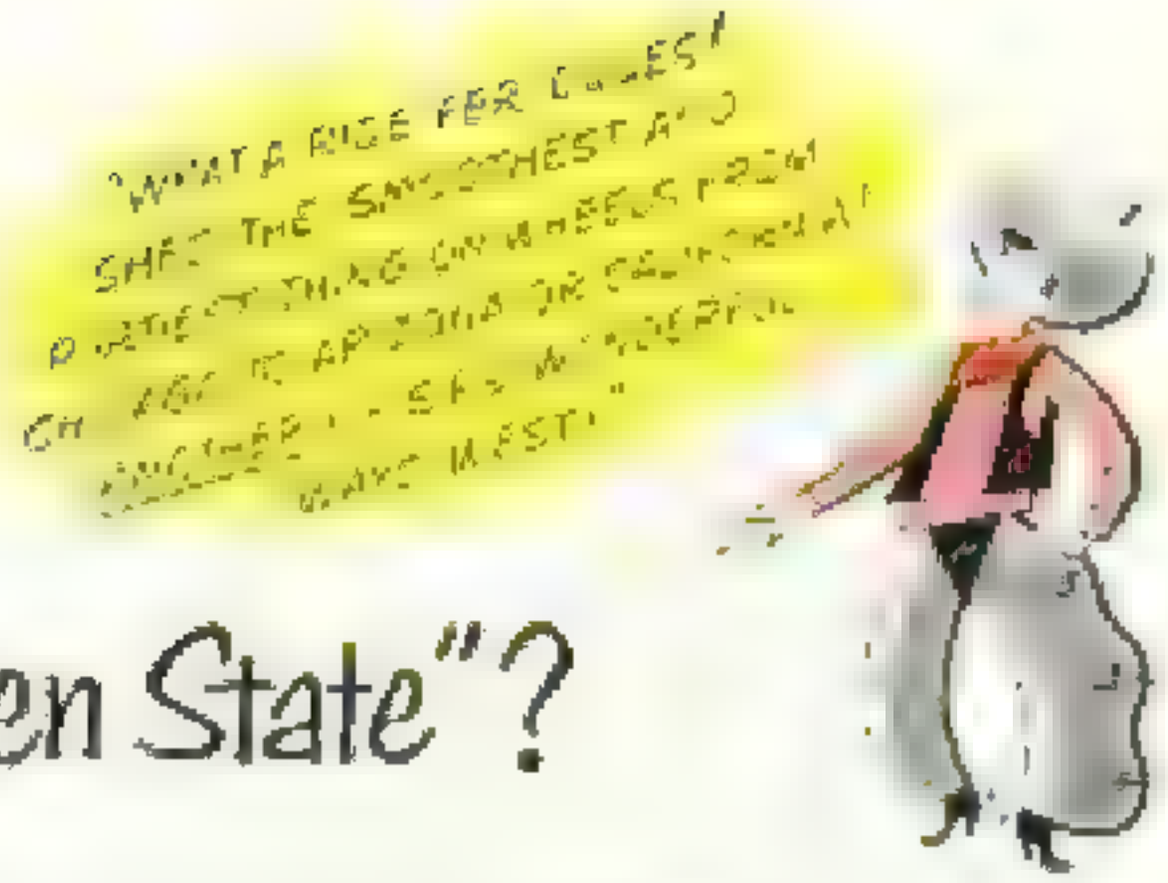

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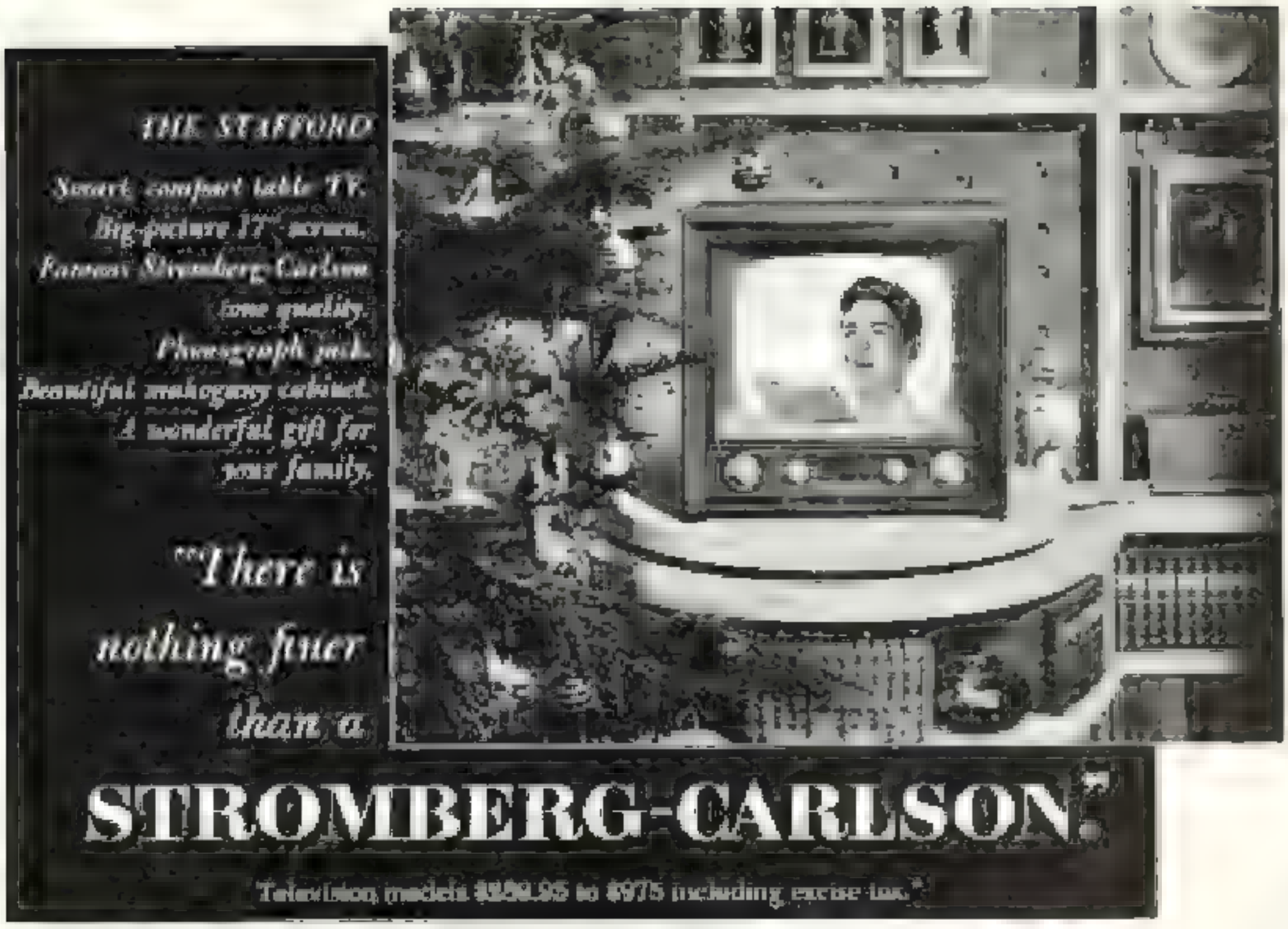

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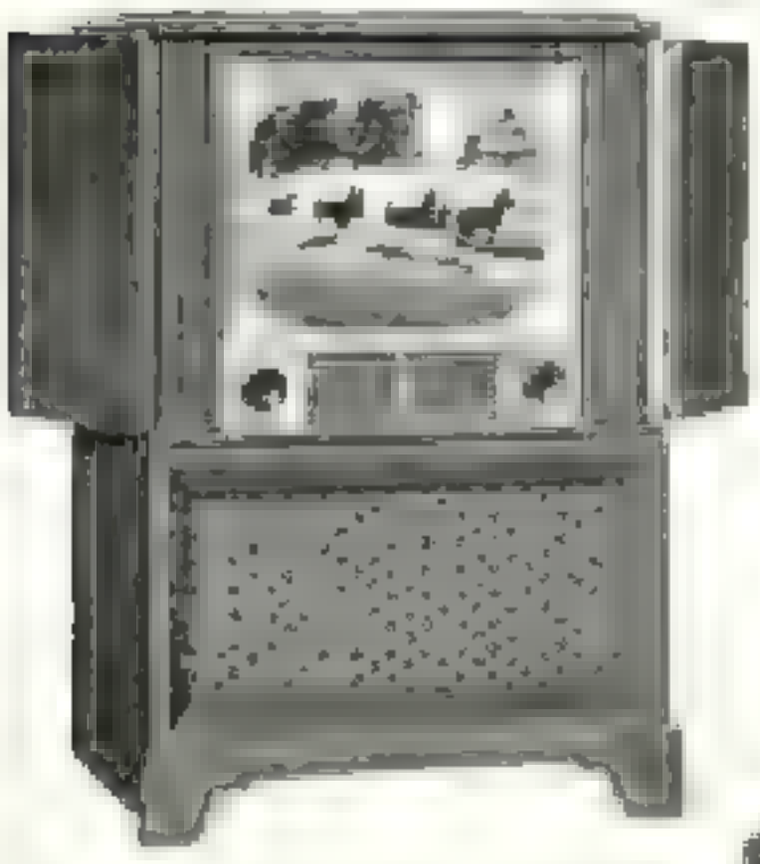

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THE ALCOHOLIC

Alcoholism is the abnormal and uncontrollable use of alcohol to an extent seriously detrimental to physical and mental health. This condition is now recognized as an important medical and public health problem.

The National Committee on Alcoholism estimates that there are about 60 million people in our country who drink alcoholic beverages at least occasionally. Only 4 million of them, however, have found that the use of alcohol constitutes a problem in their lives.

The National Committee also reports that about 750,000 of these users of alcohol have drunk uncontrollably to such an extent as to have seriously impaired their health. Physicians label this last group as true chronic alcoholics.

Fortunately, medical, health, welfare and religious agencies, industrial and other employers have taken a practical, realistic view toward alcoholism. This enlightened approach offers great hope to all chronic alcoholics—as well as to those who risk this condition.

1. What is the cause of alcoholism?

Authorities have found no one cause for this condition. Research shows, however, that alcoholics are usually people who do not seem able to face life in a mature manner because of some underlying mental or emotional condition which the alcoholic himself may not clearly recognize. They seem to seek escape by excessive drinking—and eventually they become dependent on alcohol just to go on living.

Some authorities also believe that an alcoholic's body chemistry differs from that of normal persons, and that this difference results in an unnatural appetite for alcohol. Excessive drinking, however, is in all cases a *symptom*. Often the symptom can be removed, but it is very apt to return unless the underlying trouble is eliminated.

2. How can medical science help the alcoholic?

Although there is no specific remedy for alcoholism, much can be done to help a person stop drinking completely. The success of any form of treatment, however, depends upon the alcoholic himself who must absolutely want to break the habit. Once he has stopped, most authorities agree that the real alcoholic cannot drink again with safety.

Psychotherapy may be used to help the patient recognize his problems and how to deal with them without the use of alcohol. Certain medicines, which should be used only under the guidance of a doctor, are also available. These medicines may help to wean the patient away from drink.

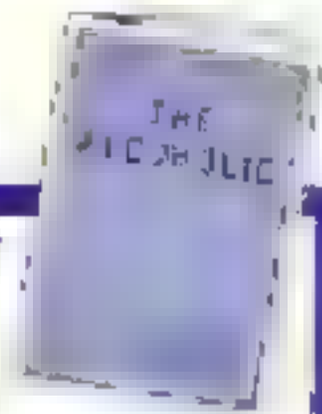
It is important, too, for the alcoholic to re-establish a routine of healthful living through proper diet, sufficient relaxation and sleep, and attention to other health measures that are usually disrupted by excessive drinking. In some cases, occupational guidance may be appropriate.

3. How can everyone help the alcoholic?

The general public—all of us—can help overcome the prejudices that have long existed about alcoholics by looking upon chronic drinkers as persons subject to serious physical and mental handicaps.

We must also help them to obtain the type of treatment that they need. This treatment may be individual or group therapy given by the doctor, or mutual aid through organizations such as Alcoholics Anonymous.

We can also support and encourage the development of programs for the scientific study and control of this problem. In these ways, we can all do our part toward restoring thousands of men and women to healthy, happy, useful lives. Additional information on alcoholism is in Metropolitan's free booklet, 125-N, "The Alcoholic."



Metropolitan Life
Insurance Company
(A MUTUAL COMPANY)
1 Madison Ave., New York 10, N.Y.

Please send me a copy of your booklet 125-N, "The Alcoholic."

Name _____

Street _____

City _____ State _____

NO CITY LIMITS Most recent U. S. Census figures consulted reveal significant change. This was the extraordinary increase in population of areas immediately surrounding the cities.

If you travel the highways, you may see this growth in progress. It is apparent not only in wider-spreading suburbs but more spectacularly in the individual homes, each with its own plot of lawn and garden, which are strung along the roads radiating in every direction.

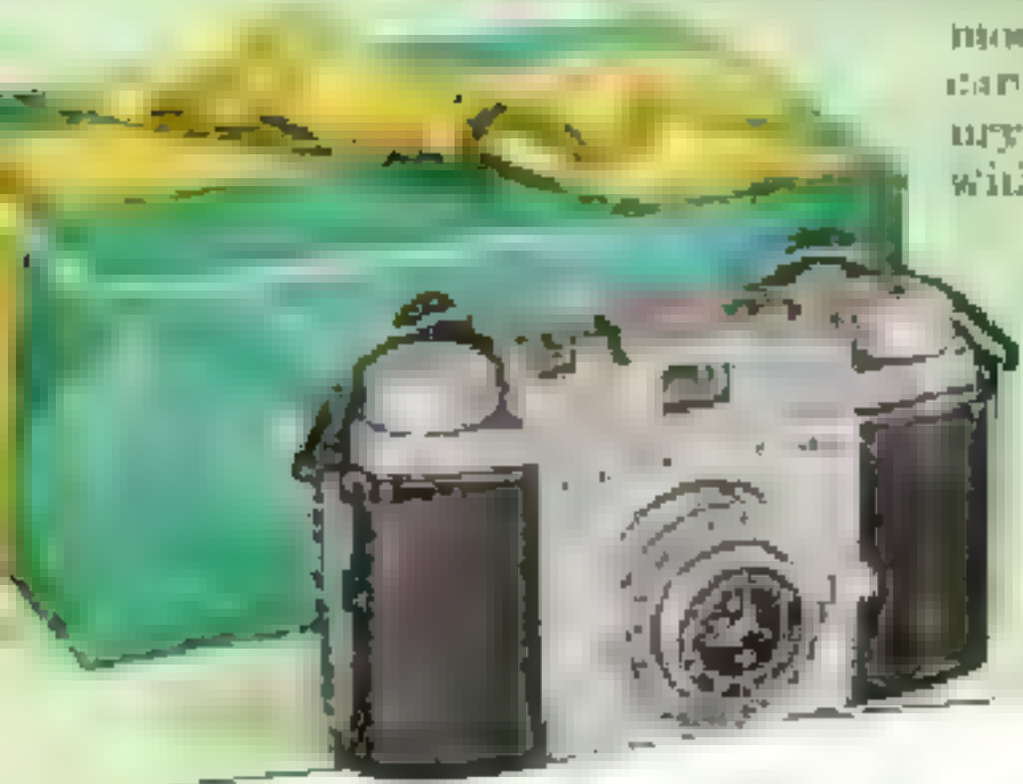
This freedom of living and working in the country, is a direct result of modern facilities of transportation. Yes, The Budd Company, which has contributed so much to the development of transportation vehicles, both rail and motor, is itself a strong example of their use. The Budd plants in Philadelphia, Detroit and Gary are surrounded by parking room for 5,068 private cars. Many of the workmen in these plants travel daily distances of twenty, thirty and even forty miles from their rural homes.

PIONEERS IN BETTER TRANSPORTATION

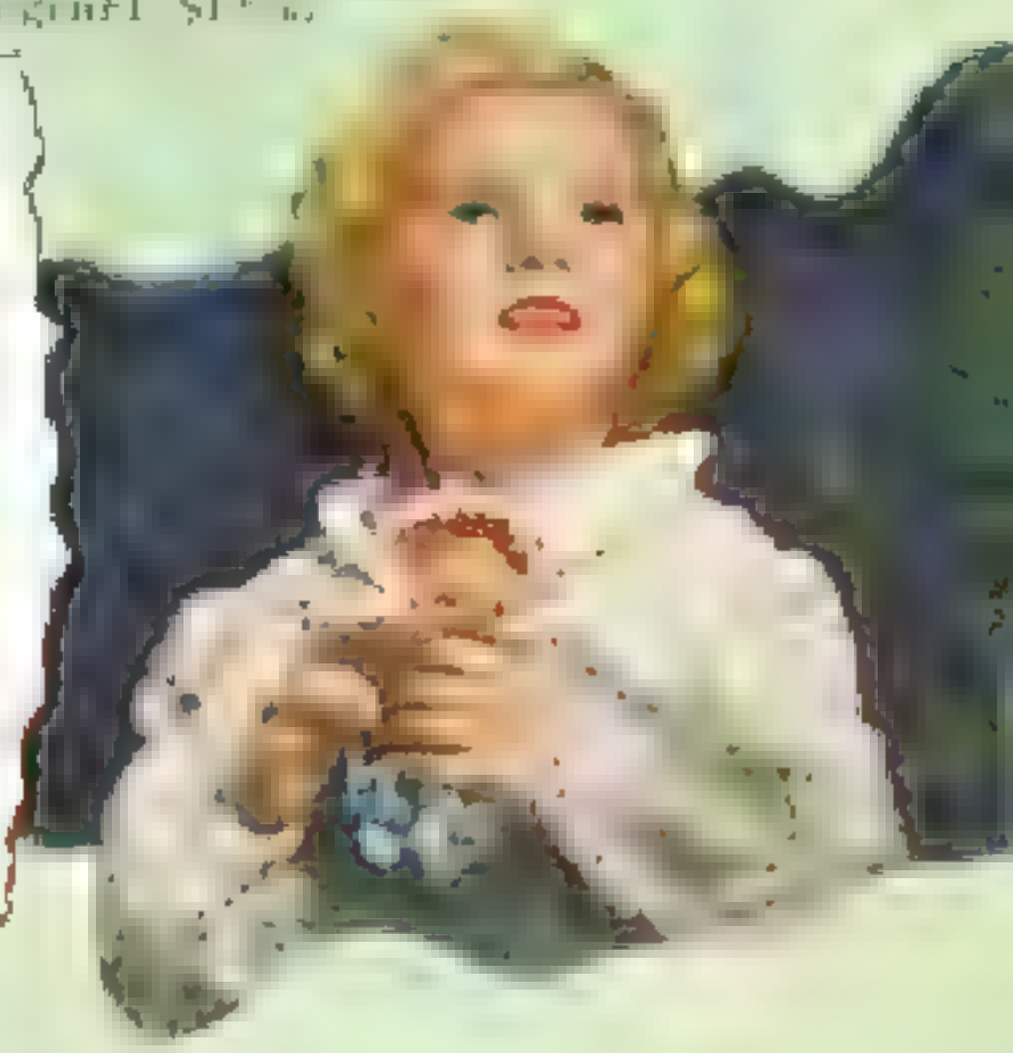

Drink
Coca-Cola
... talk about being good !

For taking color pictures . . .

Kodak 5 and 35 Camera—$95—*Kodak's newest color camera with Kodak's finest lens.* Named as "top" in amateur photographic tests, the Kodak [illegible] is now available in a moderately priced 35mm camera with modern luxury features. Flashholder with guard, $12.[illegible]

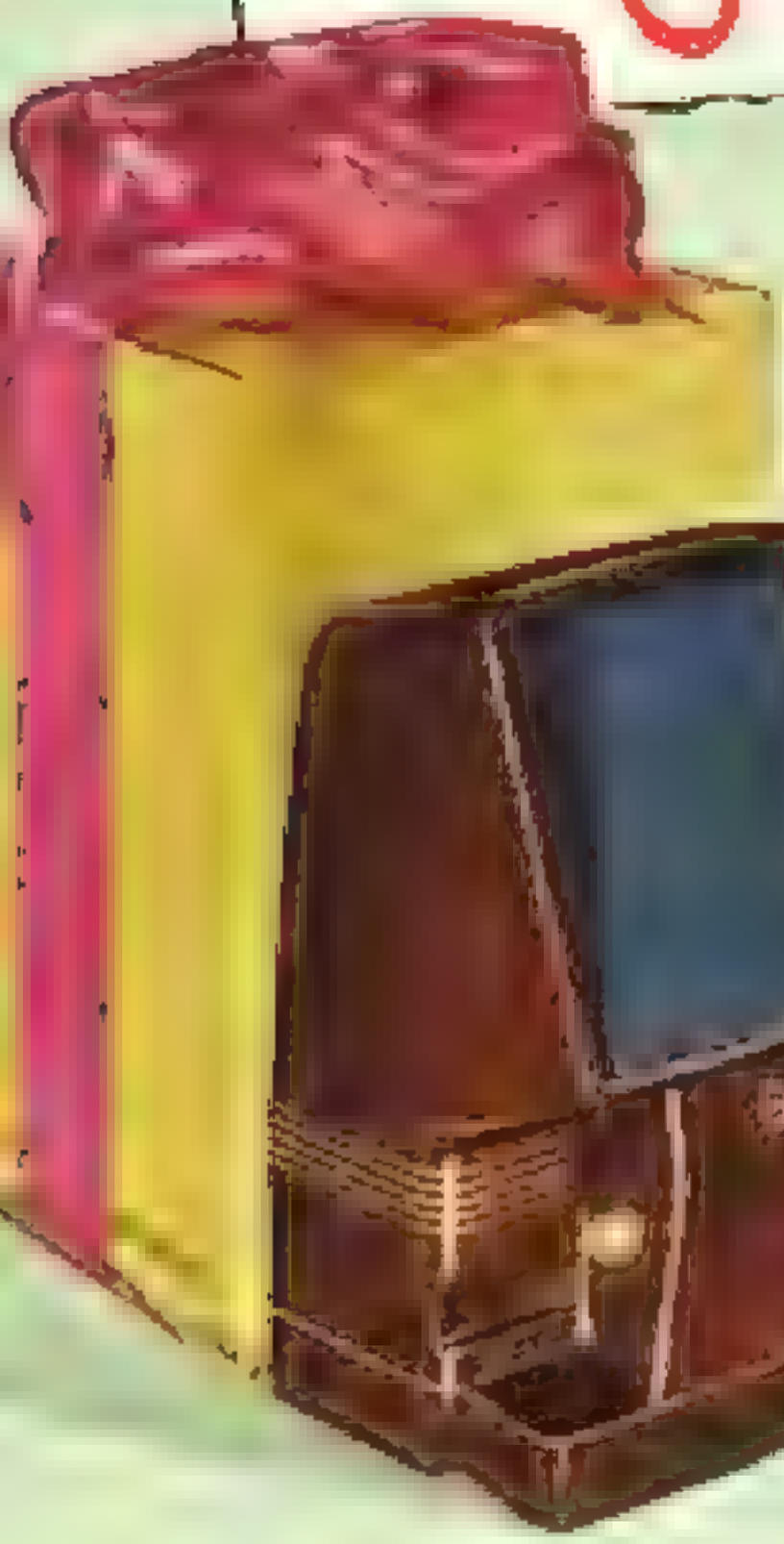


Kodak Pony 135 Camera—$36.75—*More and more people are asking for Kodak's budget-model color camera.* And they're getting the most [illegible] color-slides you could ever want. They're perfect beauties . . . or make wonderful big color prints. Flashholder with guard, $1[illegible]



Kodak Christmas Gifts that open up the royal road to *gorgeous color pictures*

For showing color pictures . . .



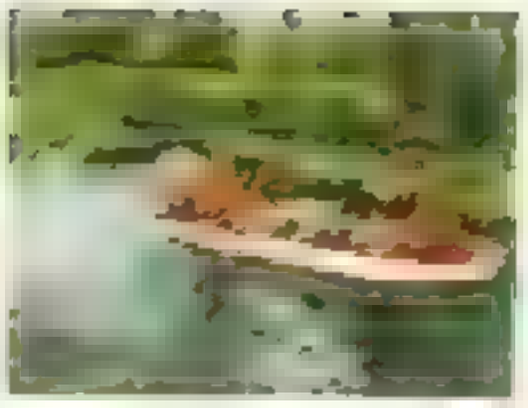
Kodaslide Table Viewer 4X—$49.50—*Here's where all good color slides hope to end up . . . in a modern Kodaslide Table Viewer.* 4X model combines projector and screen in one compact unit. Shows color slides, enlarged more than four times, clear and brilliant even in a fully lighted room.

Kodaslide Manl Projector—$24.50—*Your color fun is sure to go for this Kodaslide Projector.* Shows color slides crisply and brilliantly—as big as life and just as beautiful. Has new-type pop-proof slide feeding.

Prices are subject to change without notice and prices and tax include Federal Tax applicable when this advertisement was released for publication.

EASTMAN KODAK COMPANY, Rochester 4, N.Y.

Kodak



Florida

Best Place under the Sun

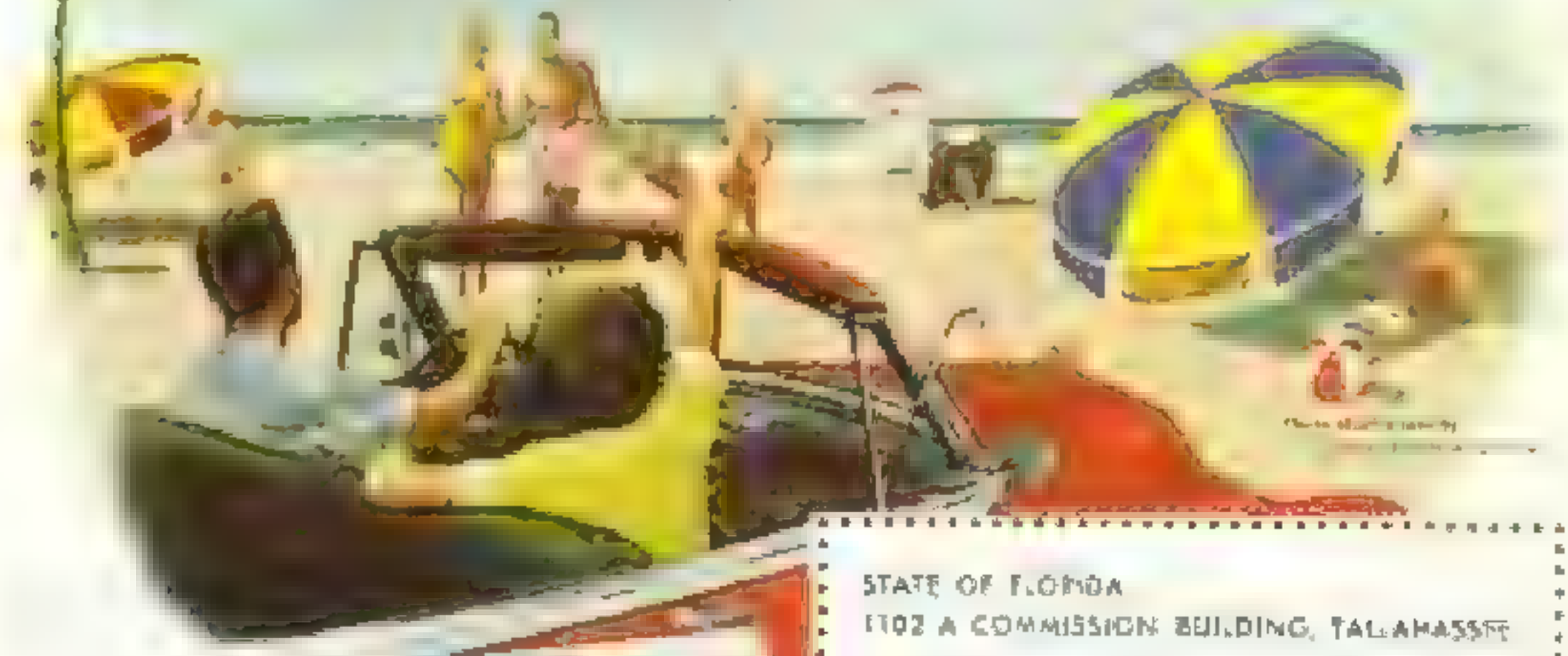
for Rest, Sport, or Fun

Come! Let the magic of Florida sunshine put new sparkle in your eye, new spring in your step, new color in your cheeks.

Whether you come for a short vacation, or with the thousands who stay all winter, you'll find wonderful accommodations, fine food, excellent schools and churches.

Whatever you seek . . . rest and tranquility in a peaceful little spot...glamour, excitement and luxury living...fishing, golfing, tennis, boating, or spectator sport...you'll find it in Florida.

You can be in Florida in a matter of hours. Plan now to see *all of Florida* and stay all winter.



FREE! 36 Page booklet in full color... Mail this coupon now!

STATE OF FLORIDA
1102 A COMMISSION BUILDING, TALLAHASSEE

Please send new, colorful booklet. "Florida, All-Year Vacation Land."

Name _____

Address _____

City _____ Zone _____ State _____

PLEASE FILL IN BLANK BELOW, DETACH, AND MAIL TO THE SECRETARY

Recommendation for Membership

FOR THE YEAR 1952 IN THE

(The list for 1951 is filled)

NATIONAL GEOGRAPHIC SOCIETY

** The Membership Dues, Which Are for the Calendar Year, Include Subscription to the National Geographic Magazine*

To the Secretary, National Geographic Society,
Sixteenth and M Streets Northwest, Washington 6, D. C.: _____ *1951*

I nominate _____
PRINT NAME OF NOMINEE

Occupation _____
(This information is important for the records)

Address _____
PRINT ADDRESS OF NOMINEE

_____ *for membership in The Society.*

Name of nominating member _____
PLEASE PRINT

Address _____

* DUES. Annual membership in United States, $5.00; Canada, $5.50; British Isles, $5.60; elsewhere abroad, $6.00. Life Membership, $150.00 U. S. funds. Remittances should be payable to National Geographic Society. Remittances from outside of continental United States and Canada should be made by New York draft or international money order.

12-51

Now, with her Zenith Hearing Aid, Mother can HEAR *as well as Dad and Sonny!*

ZENITH ROYAL $75

Tiny, light-weight, beautiful golden finish. Complete, ready to wear. See also the extra-powerful Zenith "Super-Royal." Same fine features. Same low price.

Give the Gift of Hearing

ONLY ZENITH HEARING AIDS

GIVE YOU ALL THESE QUALITY FEATURES

Exclusive, New, Patented Permaphone—assures excellent performance even under extreme heat, humidity.

Reserve Battery Switch—insures continuous hearing in event of "A" battery failure.

4-Way Finger Touch Tone Control—you can emphasize high, medium, low or full range of tones covered by the instrument.

Fingertip Volume Control—instant variation of volume as needed.

The Royalty Z *of Hearing*

By Makers of World-Famous Zenith Radio, Television and FM Sets.

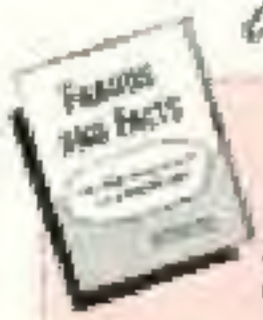
A Zenith Hearing Aid changed mother's life. It brought her from a world of half-heard sounds to full enjoyment of family activities. Thousands with impaired hearing, even many with *severe* hearing loss, find a Zenith Aid their means to full participation in home life, church and social activities, school and business. And these enlightened people know the wearing of a Zenith Hearing Aid is as acceptable as the wearing of glasses.

Zenith says—hear better or pay nothing! We believe no hearing aid need sell for more than $75. Here is Zenith's unconditional guarantee of quality: "If any $200 aid in your opinion, in any way outperforms a $75 Zenith, YOUR MONEY BACK (under our unconditional 10-day return privilege). You are the sole judge." Zenith Hearing Aid dealers in hundreds of cities, coast-to-coast join in this offer. Consult your classified telephone directory for name of nearest Zenith Hearing Aid dealer.

Bone Conduction Devices available at moderate extra cost.

Look only to your Doctor for advice on your ears and hearing.

Clip and Mail Today!



THIS FREE BOOK MAY BE WORTH $100.00 OR MORE TO YOU

Zenith Radio Corporation
Hearing Aid Division, Dept. 1264
5801 Dickens Ave., Chicago 39, Ill.

Gentlemen: Please send me your free 24-page book that tells the whole truth about hearing aids, true and false claims, and how to buy correctly. I understand it will arrive in plain wrapper and in no way obligates me.

Name _____
[please print]
Address _____
City _____ Zone _____ State _____

Telephone Folks Will Play Santa for Thousands of Kids

As you read this, telephone operators all over the country are dressing thousands of dolls for distribution to children's homes and hospitals at Christmas.

Down in Texas, other telephone people are packing gay gift boxes for remote farm families. On December 24, the pilot who patrols Long Distance cables across the lonely plains will drop them by parachute and wave a friendly "Merry Christmas to All" by waggling the wings of his plane.

Throughout the Bell System, thousands of other telephone men and women are collecting food, candy, toys and dollars for those less fortunate than themselves.

It's a long-time telephone tradition — and a rather natural one. The spirit of service and the spirit of Christmas are pretty close together. And telephone folks try to be good citizens *all* year 'round.

BELL TELEPHONE SYSTEM